Final Report:
Biological Reference Evaluation and Management Recommendations for the County-owned MSCP Lakeside Archipelago Lands San Diego County, California

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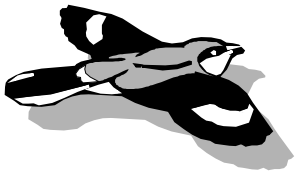

14 May 2002

CERTIFICATION

I hereby certify that the data, statements, and information furnished in this report, including all graphics, appendices, and attachments, fulfill the scope of work required for this biological evaluation. Further, the data, statements, and information as presented are true, correct, and do not mislead, to the best of my knowledge and belief.

Date:_____ Signed:_____

Kurt F. Campbell, President

RECOMMENDED CITATION

Campbell BioConsulting, Inc. 2002. Biological Reference Evaluation and Management Recommendations for the County-owned MSCP Lakeside Archipelago Lands, San Diego County, California. Report prepared for Department of Parks and Recreation, County of San Diego, 5201 Ruffin Road, Suite P, San Diego, CA 92123-4310.

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EXECUTIVE SUMMARY

This report provides methods, results, and recommendations for an initial reference evaluation of biological resources for a 45.81-hectare (113-acre) study area consisting of an east and a west site in the Lakeside area of San Diego County, California, a rapidly urbanizing region. The field work and this report were provided under Contract No. 44591 to the County of San Diego, Department of Parks and Recreation. A total of about 160 hours of field work was performed including general reconnaissance, vegetation mapping, avian point counts, and California Gnatcatcher spot mapping.

The study area lies 32 kilometers from the Pacific Ocean at the inland edge of a coastal plain and has a relatively dry, mild-to-warm Mediterranean type climate. Topography consists predominantly of fairly steep slopes cut by small, ephemeral drainages, and elevation ranges from 133 to 235 meters. Field work was conducted during a year with weather not substantially different from typical. The study area is 85% Diegan Coastal Sage Scrub of variable density, about 15% Disturbed Habitat, and about 0.3% Valley Needlegrass Grassland, with 213 floral species recorded. Vegetation was mapped into 70 vegetation polygons divided by a combination of community type, five cover classes, typical shrub height and dominant species. The primary dominant species are California Buckwheat and California Sagebrush. About 35% of the recorded plant species are nonnative (Short-pod Mustard and Tocalote are prevalent), and about 78% of the plants are herb-layer species. No plant species with special status were recorded. It appears that most of the study area has not burned in at least several decades, with high levels of shrub deadwood notable in those areas with the least evidence of human disturbance.

A total of 118 morphospecies of macroinvertebrates and 96 species of vertebrates were recorded, and another 73 species of vertebrates were judged to have at least a low but reasonable potential to occur. Animal species with special status recorded include Coast Horned Lizard, Western Skink, Orange-throated Whiptail (fairly common), White-tailed Kite (wandered onto study area), Cooper's Hawk (one pair probably nested nearby), Sharp-shinned Hawk (non-breeding), Merlin (one winter/migrant), Cactus Wren (one pair mainly off the study area), Western Bluebird (mainly off the study area), California Gnatcatcher, Yellow Warbler (migrant), and Rufous-crowned Sparrow (several pairs on each site). California Gnatcatcher was present on both sites, totaling six to eight pairs, most of which included off-site areas in their home ranges. Gnatcatcher productivity was not quantified, but appeared low to moderate. Avian point counts recorded an average of about 28 individuals and 10.7 species per 10-minute count; descriptive statistics and the most common species are discussed, but no abundance values are provided due to the low sample size.

Open space connections with other natural communities are very limited and currently not preserved. Current ownership boundaries abut both residential developments and some additional sage scrub, and have a high edge-to-area ratio. The two sites are separated by about 230 meters of residential development including the largely channelized Los Coches Creek. There is one tenuous and apparently unprotected potential wildlife movement corridor to the northeast connecting with the Lake Jennings area, and additional sage scrub is contiguous to the south of the west site, but is itself otherwise isolated. It is anticipated that the study area is not, at this time, effectively isolated with regard to California Gnatcatcher dispersal, but may be with regard to movement of large mammals such as Mule Deer.

It appears that many biological resources and functions on the study area are fundamentally intact at this time, with a good species richness of plants, especially in the herb layer, and an intermediate species richness of invertebrate and vertebrate animals that yet includes California Gnatcatcher.

Summaries are provided for encountered problems, limitations, and data gaps as well as for findings. The 28 recommendations provided for management measures and to gather additional information are divided into those at the study area scale (nine management measures and eight information-gathering measures) and at the Multiple Species Conservation Program ("MSCP") scale (11 measures). Photographs, extensive data sets, and other documentation are included in a set of technical appendices.

1.0 INTRODUCTION

This report provides information on biological resources and management recommendations for a study area in the unincorporated community of Lakeside, San Diego County, California (see Figure 1.0-1). The field work and this report are provided under Contract No. 44591 to the County of San Diego, Department of Parks and Recreation. The term "study area" refers to the entire 45.81 hectares (113.16 acres) examined for the current work, and is composed of two fragmented sections, a 18.78-hectare (46.39-acre) "west site" and a 27.03-hectare (66.76-acre) "east site," lying on either side of Los Coches Road.

These two sites were recently acquired as part of the San Diego Multiple Species Conservation Program ("MSCP"), and this work is in support of the requirements for biological monitoring under that program. Roads that approximately bound the study area are Calle Lucia Terrace and Ha Hana Road on the south and Del Sol and West Rim roads to the north. The study area is shown on the El Cajon, California, U.S. Geological Survey ("USGS") 7.5-minute quadrangle map (El Cajon 1975) and page 1232 (blocks B4-C6) of the current Thomas Guide to San Diego County (Thomas Bros. 2001).

Purposes and Scope of Work
The purposes of the current work are:

- To provide accurate and reproducible information and characterizations of current biological resources with which future work can be combined and compared,
- To provide an accurate, reproducible evaluation and prioritized listing of management needs on the study area, relevant to requirements of the MSCP,
- To evaluate the potential advantages, savings, costs, and drawbacks to various options for ongoing monitoring and management at the study area, especially with regard to California Gnatcatchers,
- To identify potential opportunities and conflicts in multiple uses of the study area, and
- To provide information and recommendations that may contribute to prioritizing funding among management actions and to evaluating the ongoing success of the MSCP.

The work was divided into the following specific tasks:

- A reference inventory, including general reconnaissance, vegetation mapping, and avian point counts,
- California Gnatcatcher studies, including general observation and spot mapping,
- Compilation of results, analysis, interpretation, focused literature searches and contacts, and recommendations both specific to the study area and more generally with regard to MSCP lands management.

See Section 3.9 for discussion of limitations to the scope of work.

Report Approach, Standards and Terms
In keeping with the purpose of the work as a reference evaluation of a small study area with general recommendations, this report provides detailed discussions of methods, results, and management recommendations in a largely standard technical format.

Standards used for taxonomy and nomenclature are cited in the relevant floral and faunal appendices, along with discussion of English names and capitalization. Both scientific names and unique English names are provided for each species recorded on the study area and/or discussed in the text due to special status (see appendices E through H). Thus, for readability and simplicity, only English names are used in the text of the report except in a very few cases where a species is discussed in text but not addressed elsewhere.

Metric (S.I.) units are used throughout this report; abbreviations are "mm" for millimeter(s), "cm" for centimeter(s), "m" for meter(s), "k" for kilometer(s), and "h" for hectare(s). For clarity, U.S. System units are

added in parentheses for a few major values and for all temperatures. Style is drawn broadly from two sources: Gibaldi (1998) and CBE (1994). Report structure is intended to follow de facto standards for technical biology consulting reports, adapted to the current scope of work.

Throughout this report, special terms and abbreviations are first used in quotation marks and explained, then used without explanation thereafter. For purposes of general discussion in this report, "fauna" is defined as members of the animal kingdom, while "flora" is used collectively to refer to members of the plant kingdom. Animals and plants identified during the current work are listed in the floral and faunal lists (Appendices E, F, and G).

Finally, the term "special status species" as used in this report refers to all taxa which currently are:
(1) specially protected species, including:

- those covered under the San Diego Multiple Species Conservation Program Implementation Agreement,
- those listed as endangered or threatened under the federal Endangered Species Act ("FESA"),
- those formally proposed by the U.S. Fish and Wildlife Service as endangered or threatened under FESA,
- those listed as endangered or threatened under the California Endangered Species Act ("CESA"),
- those listed by the Fish and Game Commission as a candidate species under CESA,
- those listed as endangered or rare under the California Native Plant Protection Act ("NPPA"),
- those covered under the federal Bald and Golden Eagle Protection Act ("BGEPA"),
- those listed as a "fully protected" species under the California Fish and Game Code ("CFP"),
- those listed as a California "species of special concern" ("SSC"), and
- those included in the California Native Plant Society's Inventory of Rare and Endangered Plants of California ("CNPS 1A", CNPS 1B, CNPS 2", "CNPS 3", and "CNPS 4"), or

(2) widely recognized pest species, including:

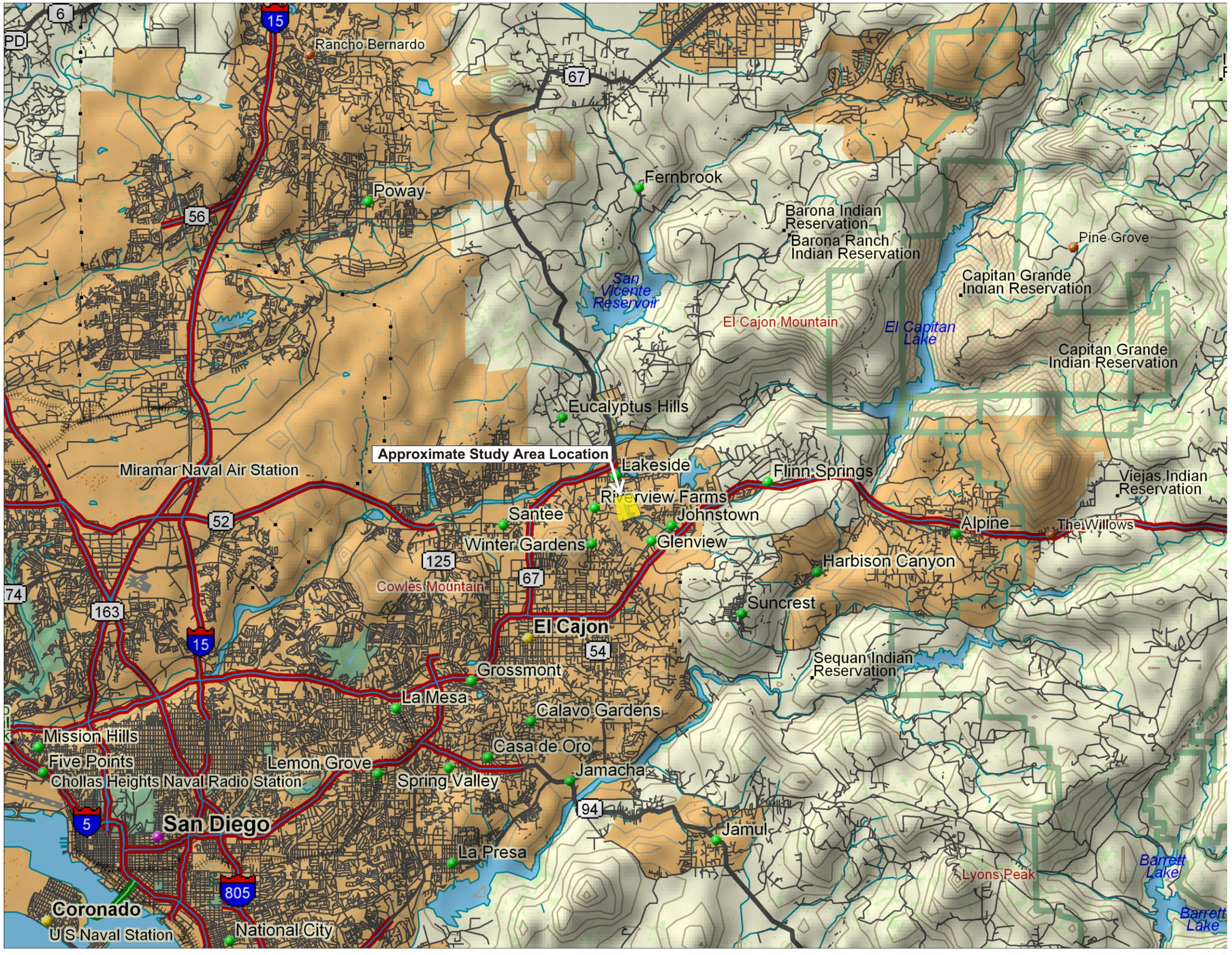
- those included in the California Exotic Pest Plant Council ("CalEPPC") list of, "Exotic Pest Plants of Greatest Ecological Concern in California" (CalEPPC 1999), and
- certain animals widely known or believed to be very harmful to native ecosystems, such as Bullfrog, Brown-headed Cowbird, and European Starling. No listing or categorization of such wildlife currently exists as an equivalent to that of the CalEPPC plant list, so species included here are those relevant to the study area and for which the author is aware of specific concerns.

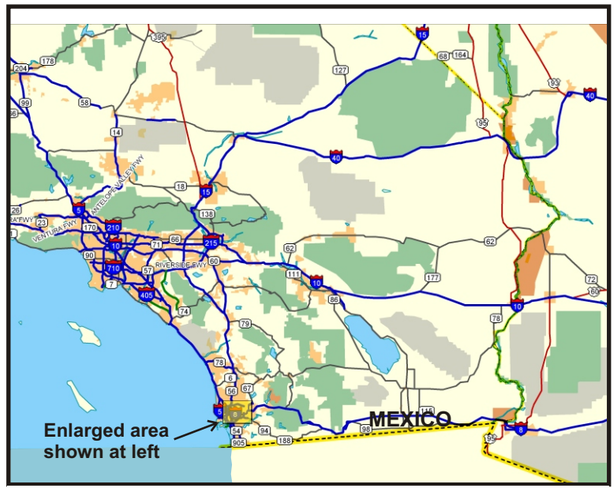
All special status species documented or considered to have some reasonable potential to occur on the study area are explicitly addressed in this report. Sources for current regulatory information on species are: CalEPPC (1999), CDFG (2001a, b, c), CNPS (2001), and information recently published in the Federal Register or California Regulatory Notice Register.

Not included are many other special categories promulgated by various governmental and non-governmental organizations. Many of these have no explicit or objective criteria for species inclusion, no peer-review process, are no longer maintained for currency, and/or are not intended for conservation beyond limiting direct killing without permits.

2.0 METHODS

Methods for this study were chosen to emphasize a balance of efficiency, repeatability, and accuracy while avoiding or minimizing obvious biases. They are discussed in relatively substantial detail compared with that in many focused studies for two reasons: first, to provide a basis for future studies that are comparable and repeatable, and second, to contribute in small measure to an ongoing discussion and evolution of methods in the conservation biology and lands management communities in southern California.





Source map: Delorme TopoUSA 3.0
Scale: approximately 1 centimeter = 38 kilometers (1:3,800,000)

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Figure 1.0-1
Study Area Vicinity
MSCP Lakeside Archipelago Lands
San Diego, California

Source map: Delorme TopoUSA 3.0
Scale: approximately 1centimeter = 1.5 kilometers (1:150,000)

2.1 Reference Inventory

The study area has apparently not been the subject of substantial prior biological study, although a cursory evaluation was performed during lands acquisition review (CDFG 1997). Thus, a general study that might uncover special resources or problems needing quick attention was deemed an appropriate facet of the current work. For this work, the term "reference inventory" is used rather than "baseline inventory". The latter term is probably best reserved for study of "pre-treatment" conditions during experimental studies, restoration work, or other potentially substantial alteration. In addition the current study, while broad, does not provide the definitive compilation of existing data from potential sources (e.g., specimen collections, historical human use and accounts) that may be implied by use of the term "baseline study." See Section 4 for recommendations to address remaining reference data deficiencies.

The scope and methods for the current work were developed in consultation with client contacts and public agencies, and this included authorization of the work under the primary investigator's permits: federal Recovery Permit (ESA Section 10(a)1(A); Kurt F. Campbell, permit PRT-781485; state Memorandum of Understanding; and state and federal Scientific Collecting Permit. All support personnel present on the study area during the current work were covered under the primary investigator's permits as applicable and followed all permit requirements.

2.1.1 Compilation of Existing Information

Prior to the initial visit, data from a variety of sources were checked. This included the California Natural Diversity Data Base ("CNDDB"; CDFG 2001c), the CNPS Inventory of Rare and Endangered Plants of California (Skinner and Pavlik 2001), predictive species occurrence list from the California Wildlife Habitat Relationships System version 7 ("CWHR"; CDFG 1999), and various published (traditional and Internet) sources on regional and county natural resources. However, the versions (data dates) cited elsewhere in this report for the CNDDB and CNPS Inventory are those from final checks performed during production of this report.

The County of San Diego provided the base map consisting of a GIS print-out with a base layer black-and-white ortho-corrected aerial photograph from January 1997 (light strongly from the southwest; resolution about 1-2 m pixels). This was overlain with 40-foot (12.2-m) elevation isopleths from USGS DEM source data and site boundaries by parcel. These data were not available in digital form, so all field work mapping was done: (1) onto paper copies at a scale of 1:3000, and/or using a Garmin GPS 12 positioning unit (no selective availability, thus mean accuracy about 3 to 4 m) for later matching with a digitized version of the paper mapping. Also provided at the same scale were printed versions of the digitized NRCS soils mapping (from Bowman 1973), plant community mapping from the county-wide GIS database (classification based on Oberbauer 1996), and fire history mapping.

Also examined prior to or during the field work was a variety of other maps including the El Cajon, California, USGS 7.5-minute quadrangle map, the current Thomas Guide to San Diego County (Thomas Bros. 2001), and various maps showing current MSCP Sub-area Plan lands.

Extensive field notes were compiled for all study area visits. Specific data gathered on visit conditions are presented in Appendix C and discussed in the subsections below.

2.1.2 General Reconnaissance

At the core of the reference inventory work is extensive documentation of the resources and potential management challenges on the study area. This was developed through careful examination of the entire study area during approximately 160 hours of wandering transects and discussions with other study area visitors and adjacent landowners on 27 days over a 6-month period. The advantages of this approach include a balance between efficiency and comprehensiveness, an opportunity to see gradual changes across seasons and at multiple scales, and when performed by a skilled practitioner, a substantial breadth of gathered information. Note that this

approach is in contrast to, and complimentary with, methods for quantitative sampling (e.g., avian point counts). While both require accuracy, a second requirement of sampling is sufficient repeatability, while the core requirement for inventorying is normally sufficient completeness rather than sufficient repeatability.

Floral and faunal lists were compiled, occurrence and distribution of species with special status were mapped and recorded, and extensive notes were taken on disturbance, human use of the study area, and other issues. Nearly 200 digital photographs were taken to illustrate various aspects of each site; see Appendix A for a sampling.

A wide variety of field guides, regional experts, and other resources were utilized prior to and during the current work as a basis for identification of species and issues (and thus most conclusions and recommendations) reported here. For example, all of the following references and contacts were consulted for information specifically on tracking and animal sign interpretation during the current work: Brown and Morgan (1983), Burt and Grossenheider (1976), Carss (2000), W. E. Haas (pers. comm., Varanus Biological Services, 2001), Halfpenny (1986), Lowery (1988-2001), Merlin (1999), S. J. Montgomery (pers. comm., SJM Biological Consultants, 2000), Murie (1974), Rezendes (1992), Sheldon (1998), Stall (1990), and Stokes and Stokes (1986).

Sources utilized for information on birds are particularly varied and numerous. Especially important sources include Grinnell and Miller (1944; habitat requirements and subspecies distribution), Garrett and Dunn (1981), Unitt (1984), and National Geographic Society (1999). References for other topics are cited in detail in the relevant appendices.

2.1.3 Avian Point Counts

Avian use of the study area was previously undocumented beyond known occupancy by California Gnatcatcher. However, information on such use is critical to understanding the functions and values of the study area itself and the larger context of land preservation efforts. Point counts provide a repeatable, quantitative sampling method for a broad spectrum of birds that is complementary to the general reconnaissance effort, strengthening the reference information developed on relative abundance of birds.

With sufficient sample size and accuracy, data generated can be evaluated against many hypotheses, even when they are developed at a later time. At larger time and/or spatial scales the data produced on species richness and turnover can contribute to information on connectivity and response to disturbances. The data set may increase in value over time through its function as reference data contributing to investigation and calibration of both local and larger scale changes.

Point count methods followed recommendations provided in Ralph et al. (1995) for extensive (i.e., station-independent) surveys. See that source for detailed discussion of the bases for, and further details on, the methods presented here. A summary of methods, including all departures from and additions beyond the recommendations, is provided below. Ten station locations were selected, with five on each site. Refer to Section 3.6.4 for further details, and Appendix H for data. Ten stations is a practical maximum at the study area due to the configurations and limited size of the two sites, the time required to travel among stations and between sites, and the minimum distances between stations needed to meet assumptions of independence among stations (250 m, Ralph et al. 1995). They were placed non-randomly to maximize sampling of the study area and minimize coverage off the study area. No particular features (e.g., plant community, slope or aspect) were selected for or avoided, primarily due to the broad objectives of the study. Stations were generally located at or near secondary trails to facilitate access. Prior to the first counts, all stations were mapped in the field, located using GPS, marked for later identification, and photographed. See Appendix H for the site, approximate slope and aspect, and GPS-mapped latitude and longitude for each station.

Point counts were conducted for ten-minute periods (stratified at 3-, 2-, and 5-minute periods) to facilitate comparison with counts using other time periods. Counts were conducted quickly upon arrival at the station.

They were conducted at each station once each month (March through July) for a total of 50 counts or 500 minutes of sampling. The complete data set is provided in Appendix H.

The following specific recommendations were followed, drawn directly from Ralph et al. (1995):

- Stations will be located at least 250 m apart to ensure independence (i.e., no or minimal overlapping of individual birds detected).
- Counts will be conducted at each station for ten minutes (stratified into periods of 3, 2 and 5 minutes) and started quickly upon reaching the point.
- All detected birds will be counted except for any judged to have been counted at a previous station.
- Both seen and heard individuals will be recorded as long as clearly identified.
- Birds will be recorded within each time stratum as: (1) within a 50-m radius from the station, (2) outside the 50-m radius, or (3) flying over. This will allow rudimentary density estimates (without weighting for detectability).
- Individuals will be counted at the location where first detected and time of first detection, even when not identified until they have moved or a new time period has begun.
- Adverse weather will be avoided (e.g., dense fog, strong winds, extended rain).
- Stations will be counted in the same order each time, starting at approximately the same time relative to sunrise, and finishing within 4 hours after sunrise. Note that counting stations in the same order each time is recommended as the preferred method where the primary purpose of the data is for comparison with future data sets at the same study area. For the current work this was judged to be a higher priority than maximizing comparability with point counts investigating regional issues, which are best counted by randomizing the order of stations within sites and the order of sites within a day.

The only deviation from methods for extensive counts specified in Ralph et al. (1995) is:

- On point counts in March, the observer used the technique known as "pishing" (making a loud, scolding "shhh, pshhh, pshhh" sound with the mouth), which apparently mimics a generic avian alarm, and increases detectability of birds at closer distances. This was done based on recommendations in Zimmerling and Ankney (2000), but discontinued after the March survey due to concerns (pers. comm., C. Winchell, U.S. Fish and Wildlife Service, 2001) that this would remove comparability between these and other point count sets being conducted throughout the region. Based on the experience with and results of the March and later point counts at the study area, it appears that any potential effect is relatively small, in keeping with Zimmerling and Ankney's findings that visibility of individuals increased by about 10%, but that there was no statistically significant change in vocalizations.

Additional point count methods used beyond those provided in Ralph et al. (1995) are:

- Prior to the March point count survey, the observer practiced distance estimations by locating an object roughly 50 m away, assigning it as beyond or closer than 50 m, and then measuring the actual distance with a 300-foot tape measure. This was done several times on several different days, in different directions, and on varied terrain, but always in open shrub lands similar to that where the stations were located. Because the study area was known to be occupied by California Gnatcatchers and potential nest predators, and because growing vegetation would also have made it of little use, no attempt was made to flag sample distances at the stations.
- Birds noted only in flight are additionally recorded as either utilizing the landscape (e.g., actively foraging swallows and raptors, and raptors using thermal updrafts) or not (e.g., birds commuting between distant habitat patches off-site, such as cormorants over an upland site, or birds migrating high overhead).
- Birds first noted in flight which then land are recorded for the time and location where they land.
- Birds are only counted when they have clearly fledged and moved away from their nest. Thus young raptors, which often spend several transitional days immediately adjacent to the nest, would not be counted until at least located in a part of the tree or cliff they are not expected to have reached by walking or climbing.

- Vocalization type is typically used to categorize birds that are heard only with regard to whether or not they are assumed to be flying over or perched. Thus flight calls for a particular species are used to categorize a bird as in flight, making it important to separate calls accurately by type for species heard only.
- When a flock is only heard, only the number definitely heard is recorded, but when a flock is seen and individuals cannot be precisely counted, a best estimate is used. Note that with or without this method, point count censussing assumes that at each station an observer has a generally "good" opportunity to see and hear birds, and (for comparison among stations) that stations are comparable in this regard. This particular method is important to make explicit when a correction factor is to be applied to the data to adjust for detectability (this was not done in the current work).
- No individual birds should be 'discarded' (not counted) due to lack of identification, unless they are at the level of simply, "unidentified bird" (e.g., an unrecognized call). Instead they should be retained at the highest level of identification supported (e.g., "hummingbird sp."). Variability among surveyors in such treatment can substantially affect estimates of abundance for some groups, or for overall avian abundance.

Numerous issues that may substantially affect data generated from avian point counts are typically not addressed either in published work on suggested methods, in published results, or both. In an effort to aid future comparability while also allowing current point counts to provide censussing of a broad a spectrum of bird species and behaviors, the following discussion of detailed methods is provided.

Birds recorded but not identified to the level of species are counted in the totals and other statistics for individuals but not the totals or statistics for species, except where they clearly represented species otherwise unrecorded. Thus, "raptor sp.", "hummingbird sp.", and "kingbird sp." (the only categories used here other than at the level of species) did not add to the overall species total for the current work, as species in all three groups were also recorded at the species level of identification during the current work. However, they were counted in the total species number for the particular counts on which they occurred, when others (hummingbirds or kingbirds) were not recorded as identified to species. For example, if a flycatcher in the genus "Empidonax" had been recorded but not identified to species, it would have added to the species total for the current point count work, since no Empidonax flycatchers identified to species were recorded during this effort.

"Fly-by" (also called "fly-over") birds were not generally added to the totals calculated for numbers of individuals or species. This is standard practice for point count analysis (Ralph et al. 1995). The rationale is that such birds are neither making any use of nor influencing the study area. However, totals here do include small numbers of birds judged to be foraging or hunting while in flight over the study area, as they are anticipated to be making use of the study area in the same way that a bird foraging from a perch at the same distance from the observer is making use of the study area. For the current work, most observations of swifts, swallows, and raptors (including Turkey Vultures) are included. Few or no migrant or commuting individuals of these species were recorded during the current work, although all these groups are primarily diurnal in migration. Fly-by individuals counted in totals are marked in the raw data tables in Appendix H with a bold, italic, and underlined font. These groups are otherwise poorly censussed by point counts and their niches, which make important use of air space, are potentially underappreciated in evaluations emphasizing point counts with standard methods.

The point counts were designed as '2-interval' counts, using the terminology of Bibby et al. (2000; p. 102); this is apparently the most common type of quantitative bird census currently being conducted in San Diego County (pers. comm. C. Winchell, U.S. Fish and Wildlife Service, 2000). A radius of 50-m was set, and all birds recorded were categorized as inside or outside of the resulting circle. This allows a calculation of density with an adjustment for detectability, but one must guess in applying the detectability adjustment, as this format does not allow testing of how detectability for a given species attenuates across distance (e.g., half normal to a fixed limit). Because the sample size was highly limited and fragmentation and disturbance make generalizations about distribution across the sites tenuous, no estimates of total abundance were made for any species based on the current results.

An assistant was used for marking time periods on all counts. The assistant remained stationary (generally sitting) and silent except for marking the time periods, and provided no other assistance or cues to the observer. Observer and assistant wore no brightly colored clothing and kept voices low while moving among the stations.

No significant logistical problems were encountered during the point counts, with no cancellations due to weather. At 2 of the 10 stations, flagged reinforcing bars used to mark locations were removed, but the point locations were found without great difficulty and confirmed at a later time using the GPS coordinates.

2.1.4 Vegetation Mapping

Mapping was performed at a level of accuracy using a minimum mapping unit criteria of approximately 0.02 h (about 2150 square feet, or a square 46 feet on an edge), and avoided assumptions regarding what was matrix and what was inclusion ("neutral ground mapping") so that vegetation types occurring in smaller patches were not under represented. Aggregation was performed using a minimum polygon size of 0.04 h (about 0.1 acres), and the relative uniformity of the study area with regard to plant communities resulted in a mean polygon size of 0.65 h (range 0.01 to 3.27 h).

Vegetation mapping for the entire study area was performed gradually between or after other field work tasks, typically in late morning or at midday when shadows were not a hindrance and animal activity was low. This allowed many re-checks of mapped areas over time and from varied angles. The following data were recorded directly onto paper maps of the study area during this work, and each is detailed below.

- trail locations
- plant community classification
- shrub cover estimation
- typical shrub height estimation
- dominant plant species

The resulting vegetation community maps and associated data for both sites on the study area are presented and discussed in Section 3.4 and in Appendix D of this report.

Trail Locations

All trails meeting minimum criteria were categorized and mapped as a basis for evaluating impacts. Trails were classified as follows:
Minor - 1 m or less in typical width, with minimal to moderate visible impacts,
Moderate - 1 to 2 m in typical width, with visible impacts neither very minor nor very substantial, and
Major - over 2 m in typical width, with moderate to substantial visible impacts

Analysis and graphical presentation of this information is not provided here due to the need to prioritize available resources under the existing project, however this information is reflected in conclusions and recommendations for the study. This limitation should not prevent proper management of trails, as discussed in the management recommendations provided in Section 4.1.

Visible impacts used in assessing trails included soil compaction (tested by firmly inserting a 6-cm knife blade into surface soil at multiple points), soil erosion, active use by people, and visible incursion along or association with the trail by nonnative ruderal plants, especially invasive species not otherwise common or abundant on the study area.

Plant Community Classification

Plant community classification followed that of Oberbauer (1996) for San Diego County. This is a suggested revision of a draft classification scheme by Holland (1986), which has also been revised for classification of wildlife habitats in the CWHR system (CDFG 1999). These classification systems currently lack specific criteria

or definitions for categories, although Holland (1986) does provide anecdotal notes on description, site factors, characteristic species, and distribution.

At this time, most plant ecologists appear to agree that vegetation at the community level exists as a continuum rather than as discrete plant communities. However, the utility of plant community concepts for efficient and effective classification is also widely recognized, and recommendations have been made that plant communities be defined operationally regardless of the theoretical nature of variation in associations (Palmer and White 1994, cited in Sawyer and Keeler-Wolf 1995). For this reason, we developed provisional criteria that were used to define the plant communities found on the study area.

For the current work we defined Diegan Coastal Sage Scrub ("32500" in Oberbauer 1996) as having (1) an absolute shrub cover of 10% or more by shrubs typical of this community, unless burned within the last 5 years and expected to recover naturally to such cover, and (2) having a lower absolute shrub cover for non-sage scrub shrubs than for sage scrub shrubs, within the given polygon. Holland (1986) lists the following species as characteristic shrubs of this community on the mainland: California Sagebrush, California (=Flat-topped) Buckwheat, Saw-toothed Goldenbush, Deerweed, Mesa Bushmallow, Laurel Sumac, Lemonadeberry (*Rhus integrifolia*), and White Sage.

One small polygon is classified as Valley Needlegrass Grassland ("42110" in Oberbauer 1996). This community was operationally defined as having (1) absolute cover of at least 10% native needlegrass (*Nassella* [*pulchra*], also classified as *Stipa* [*pulchra*]), unless burned within the last 5 years and expected to recover naturally to such cover, (2) having an absolute cover of nonnative plants less than that of the native needlegrass, and (3) not classifiable as any other native-dominated community (e.g., shrub- or tree-dominated types).

All remaining portions of the study area are dominated by various mixes of nonnative, ruderal species of annuals and/or short-lived perennials. One polygon, E35, could arguably be classified as "Nonnative Grassland" (class "42200" in Oberbauer 1996; refer to Section 3.4.1 and associated figures, and Appendix D). The most common vegetation type in that polygon was nonnative grasses. Holland (1986) notes that this community type is "often associated with numerous species of showy-flowered, native annual forbs," and is, "on fine-textured, usually clay soils". However, polygon E35, while grassy, also supports substantial amounts of ruderal forbs and very few native wildflowers, and is located on sandy loam. Therefore, this polygon is classified with others dominated by nonnative ruderal vegetation as, "Disturbed Habitat" (11300"), per Oberbauer 1996.

An important issue regarding terminology is that the categorization of "Disturbed Habitat" is assumed not to refer to the presence or relative quality of habitat for any particular species, species group, or community. Instead, it is assumed to follow the meaning for habitat in Noss et al. (1997, p. xv): "the collective surroundings of many organisms with similar requirements". Thus, "Disturbed Habitat" is treated as if it were termed, "Disturbed Upland Vegetation". Working under this concept, this community type is defined as (1) not classifiable as any native-dominated community, (2) having an absolute cover of 10% or more by nonnative, short-lived plants adapted to disturbed conditions, unless burned within the last year and expected to recover naturally to such cover, (3) having the absolute cover of native herbs no more than half that for nonnative, short-lived plants adapted to disturbed conditions within the given polygon, (4) in all cases no more than 20% absolute cover of native herbs, and (5) not within federally jurisdictional waters of the U.S. under Corps of Engineers delineation methods (COE 1987 and subsequent clarifying materials) except for ephemeral streambeds.

Shrub Cover Estimation

Fractional cover of vegetation polygons by the shrub layer was estimated using five classes: 1 (0 - 10%), 2 (10-25%), 3 (25-50%), 4 (50-80%), and 5 (80-100%). A visual estimate of the outer convex polygon of each shrub was used as the basis for coverage; only live material was counted in this estimate (but including any live, leafless stems of deciduous shrubs).

Data checking for estimated cover consisted of limited spot checking using the line-intercept method. This method for estimating vegetation cover is widely used in analysis of wildlife habitat (Bonham 1989; Bookhout 1994). A transect, or straight line, is chosen randomly within the area of interest or polygon. A measuring tape or other measured line is run along the transect, and the length of interception by each of one or more shrubs is measured cumulatively along the line. The sum of the intersect distances divided by the total transect length is the fractional cover. Distances where two or more shrubs intersect the line at once are counted only a single time.

The herb layer was not counted in transect measurements, including large annuals and biennials such as Short-pod Mustard and small or low-growing perennials such as Cudweed Aster. Deerweed was included, even when small, both because it is a perennial and is often noted in literature as a component of coastal sage scrub communities. Otherwise, cover from all shrub species was counted. At the time of year when much of the mapping was conducted (summer to early fall), many coastal sage scrub plants have lost much of their foliage for the dry season. To avoid bias due to this effect, shrub cover extent was based on the minimum convex polygon formed by the intact stems.

The error rate indicated by the line-intercept method was comparable (about 5%) to that in a prior vegetation study of California Gnatcatcher habitat suitability conducted by the author in western Riverside County. In that study, the observer used this method of spot checking with line-intercepts against visual estimates and found an error rate of just under 4%, with errors appearing to be largely random, as opposed to systematic due to cover type, slope, or light angle. It is certainly recommended, however, that observers should be cautious in using visual estimation of vegetation cover until they have substantial feedback from more objective methods such as line-intercept.

Typical Shrub Height Estimation

Typical shrub height was estimated by taking several measurements within polygons using a yardstick, then rounding the average to the nearest foot (0.3 m). Again, a visual estimation of the outer convex polygon of each shrub was used as the basis, but with an averaging of the height over the total area of the shrub.

Dominant Plant Species

Dominant species were recorded for each polygon using a variation of the, "50/20" rule used in wetland delineations across the United States under Corps of Engineers methodology (COE 1987). The single deviation from this is in evaluating only the “top layer” (i.e., whatever forms the uppermost layer at any point) rather than calculating layers separately and then combining the lists of dominants at the end. This was a practical necessity for budgetary reasons, but in a landscape of broken shrub cover without substantial tree layer, is judged more than adequate for current needs. The size and terrain of the study area, difficulty of determining dominants in layers beneath an existing canopy, breadth of scope and limited funding available for the study, and complex phenology of herbs as a whole combined to preclude a quantitative evaluation by layer at the scale of the study area.

None of the study area has any substantial tree layer, although trees (mainly nonnatives) are very common in surrounding areas. Under the 50/20 rule, "dominant species are the most abundant plant species (when ranked in descending order of abundance and cumulatively totaled) that immediately exceed 50% of the total dominance measure..., plus any additional species that individually comprise 20% or more of the total dominance measure." Note that as interpreted here, the 20% criteria refers to 20% of total cover, not 20% of whatever shrub cover is present.

Finally, note that while only shrub species cover was used for community classification within shrub-dominated communities, dominant plant species in all polygons included all plant species meeting the above criteria. For example, in several polygons, Short-pod Mustard is listed as a dominant species although it was ignored for purposes of shrub community classification.

Other Factors
Initially it was planned to include estimates of typical slope and aspect in the classification scheme. While these factors clearly influenced the vegetation on the study area, it was decided that more utility was gained by not splitting otherwise uniform vegetation polygons on these bases alone. Thus, a number of vegetation polygons mapped as continuous patches by all other criteria are at heterogeneous by slope and aspect. This allows the reader of the vegetation map to assume that, except in two or three extreme cases where polygons are split only due to a sharp ridge line or other very conspicuous feature, adjacent polygons all differ directly in vegetation classification, thus some combination of community, fractional shrub cover, typical shrub height, or dominant species. It also proved impractical on this study area to incorporate reflections of disturbance as a mapping criteria, as the scales and abruptness for different disturbances varied considerably, and also disturbances varied among point, linear, and polygonal features. Notes on disturbances by area were kept, however. Finally, note that no information on ground litter or deadwood was kept.

2.2 Coastal California Gnatcatcher

Prior to the current work, the study area was known to be occupied by California Gnatcatchers. However the numbers, population parameters, and threats were unknown. Probably no other species covered under the MSCP has so high a public profile or is so recognized as at the center of conflicts over land use in urbanizing southern California. Thus, the scope of work for the current study was planned early on to include clarification of the status of this species on the study area.

California gnatcatcher work consisted of two parts: (1) focused work utilizing spot mapping (also called territory mapping) to determine observed use areas and numbers of California Gnatcatchers on the study area, and (2) integration of study area and other information as a basis for recommendations at the study area. "Observed use areas" is intended as a neutral term to refer to those areas within a minimum convex polygon surrounding the observed locations, and believed to refer to a single individual or mated pair. As groups of such locations develop during the course of spot mapping, it ideally becomes clear how many home ranges are present and whether they contain a mated pair or a single individual. Note that a home range is the area which an individual uses over some defined period of time (typically one year), while a territory typically lies within that area and is that area from which the individual will attempt to exclude all others, generally except for its mate.

Spot Mapping
Spot mapping was conducted in accordance with current techniques (International Bird Census Committee 1970, Bibbey et al. 2000). Observations were recorded by marking a map in the field at a scale of 1:3000 and recording ancillary data including time, numbers, plumage(s), and any noteworthy behavior (e.g., carrying nest material). Initially, an effort was made to record locations of observations using a GPS unit (see details in Section 2.1.1). However, this method was discontinued at an early stage for several reasons. It became clear that this method would result in potential disturbance to nesting birds (exact nest sites were often unknown at the time of point mapping), substantial impacts to known-occupied habitat appeared inevitable (e.g., crashing through brush on steep slopes), and substantial time would be used reaching many locations. In comparison, carefully marking a field map and confirming each location through triangulation was judged nearly as accurate, much quicker, and much less intrusive to gnatcatchers and other species.

Separate locations closer together than about 15 m were not generally recorded as separate points. Moving gnatcatchers were recorded at roughly uniform distance intervals of about 50 m to avoid potential bias in spatial data. When nests were located incidental to the mapping, they were also mapped. In order to minimize potential impacts to gnatcatchers, and because our study did not involve quantitative analysis of habitat use, focused nest monitoring, or behavioral study per se, we did not actively follow located individuals, did not record locations at timed intervals, and did not play taped vocalizations after an individual was initially located.

Vocalization recordings were used quite sparingly to avoid unnecessary disturbance to the birds, to minimize the potential of "moving" birds we were attempting to map, and to avoid conditioning the birds to the presence of tapes. Tapes were never used when we suspected we were close to a nest, or when a potential predator of nests or adults was detected as close by (distance varying by species). Species so categorized included small to medium-sized raptors, Greater Roadrunner, Western Scrub-Jay, Common Raven, Loggerhead Shrike, American Crow, Cactus Wren, and Northern Mockingbird. It was assumed that reptiles and mammals that are potential nest predators would not be advantaged by use of recordings, as they probably initially locate nests either without cuing in on adult behaviors or else generally do so at times of day when we were not spot mapping (with rare exceptions).

Spot mapping was chosen as the basic approach for gathering data on California Gnatcatchers at the study area because it is much more efficient (more data per unit time) than more general census efforts such as point counts or line transects when data are sought on a single species, yet it is relatively non-invasive compared with techniques such as mark-recapture studies (e.g., bird banding) or intensive nest monitoring. Gnatcatchers are often present at low densities and often are absent from apparently suitable areas. Information available from spot mapping includes basic spatial data, population estimates that are reasonably accurate within a moderate degree of effort at the scale of the current study, and a variety of anecdotal information such as partial data on nesting, productivity, and potential predators.

Focused spot mapping work was conducted at the study area on 10 days from 15 March through 10 July for a total effort on this task of approximately 40 observer hours. In addition, a substantial number of locations were recorded for gnatcatchers during other tasks. This resulted in a total of 107 field-mapped point locations (71% of these from the focused work). Of this total, 76 are on the study area, and the remainder are suppressed at the request of the client to protect the privacy of adjacent property owners. After aggregating points believed to refer to the same individual (or group) and closer together than about 50 m, the resulting total of 59 observed locations were mapped, by plumage and number (Section 3.8.1 for details and mapping results).

Evaluation and Incorporation of existing Literature
Until relatively recently, the literature on California Gnatcatchers was sparse. However, today this is a relatively well-studied species compared with many other North American songbirds. Because the literature on this species is widely dispersed and mostly recent, a bibliography of scientific work on this species is provided here in Appendix I. The interested reader may want to review the recent compilation of information on this species provided in the Birds of North America series account (Atwood and Bontrager 2001). Work specifically reviewed for the current evaluation includes the Biological Monitoring Plan for the MSCP (Ogden 1996), a consulting report for a nearby study area providing general biology information and results of a gnatcatcher survey (EAA 1994), recent literature on census techniques, and several recent papers addressing the use and potential value of California Gnatcatcher as a keystone, indicator, and/or umbrella species for the larger natural community. This material is summarized and discussed in Section 3.8.1, and recommendations arising from this work are provided in Sections 4.1 and 4.2.

2.3 Data Compilation, Analysis, and Presentation

The following data sources were checked before, during, and/or after the field work. Data dates shown in the cited references list (Section 6.0) are for the most recent that were checked: the California Natural Diversity Data Base (CDFG 2001c), the California Native Plant Society's Electronic Inventory (Skinner and Pavlik 2001), and the California Wildlife Habitat Relationships System (CDFG 1999).

Upon completion of the field work and examination of some specimens by outside experts, the floral and faunal lists were compiled and final literature research was performed, including both biological and regulatory issues. Computer mapping was performed and data analyzed as described in this report. Software used for all graphics

was CorelDRAW 10. No GIS program was used as a final product because the base data was not available in digital form from the county and there was no budget to develop or purchase such data. Beyond this, such data also have required additional time and effort for data entry, proofing, and analysis judged better spent elsewhere under the project limitations. With these results, the report was developed.

3.0 RESULTS AND DISCUSSION

This section, along with the appendices and figures, provides a summary and evaluation of the results and findings on the study area under the current work, as well as a brief discussion of the data gaps and limitations.

3.1 Current Goals and Management

Land parcels constituting the study area were purchased for preservation approximately three years ago. Based on available documents and discussions with County of San Diego personnel, the county has set the following general goals for preservation and management of the study area under the MSCP program:

- Preservation of connectivity, especially wildlife movement corridor utility,
- Contribution to viability of California Gnatcatcher populations in the MSCP area,
- Preservation of other biological values potentially present on the study area
- Provide opportunity for appropriate passive recreational activities.

Management measures for the study area thus far have included (1) identification and initial purchase for preservation, (2) initial identification of several potential concerns including unauthorized use by off highway vehicles, (3) limited visits by Department of Parks and Recreation personnel warning motorcycle users of acceptable study area uses, (4) boundary marking, (5) permanent signs notifying the public of study area preservation and acceptable study area uses, (6) some publicity advising the public of the newly preserved land and its values, and (7) contracting, support, and direct assistance for the current work.

The remainder of Section 3 provides results and findings for the current work implicitly in light of these stated goals and management measures.

3.2 Physical Setting

The following topics are briefly summarized in this section: the landscape context, geology and topography, climate, and observed hydrology.

3.2.1 Landscape Context

The study area lies near the inland edge of a large, rapidly urbanizing, semi-desert, coastal plain at low-temperate latitude. The closest point of the Pacific Ocean lies just over 32 km away, directly west at La Jolla Bay. Similarly, the highest peaks of the Laguna Mountains, reaching 1944 m, lie almost directly east about 44 km away. The coastal plain consists of a series of mesas (old, eroded terraces), stepping up in elevation to the east and with water-carved canyons trending east to west. Elevations of 1500 to 2000 m, where predominant natural vegetation currently changes from sage scrubs to chaparrals, dominate the landscape starting at about 6 to 10 km to the north and east of the study area.

The study area itself consists mostly of two facing slopes on low hills in a small, north-south trending valley. The two sites are 228 m apart at their closest point (324 m between natural communities), separated by a flat valley floor that is fully developed to residential housing, streets carrying regional traffic, and a channelized creek. Elevation on the study area ranges from about 133 to 235 m (435 to 770 feet) above sea level. The study area is within the San Diego River watershed; see Section 3.2.5, below, for further information on hydrology.

Urbanization has largely surrounded the study area at this time. Both sites retain connection to adjacent natural areas, but in a larger context, connectivity is tenuous. See Section 3.8.4 for more detailed discussion of study area connectivity, including landscape linkage, wildlife movement corridor, and impact buffer issues, and see Pryde (1976) for further details on geography of the region.

3.2.2 Geology and Topography

As noted by Sharp and Glazner (1993), "Southern California . . . is one of the most rapidly deforming areas in North America, if not the world." At the edge of 2 continental plates, tectonic activity is substantial in the region as a whole, though faulting is variable. The dominant rocks of the study area vicinity and foothills to the east is said to be, "Mesozoic intrusives", in this case granite from the Sierra Nevada batholith, and it also appears that the study area vicinity holds areas of, "early Mesozoic metamorphics (rocks of the Mojave Region)" (Donley et al. 1979).

The majority of the study area soil consists of sandy loams (see Section 3.3), holding substantial outcrops of moderately weathered and fractured, fairly light granitic boulders. One portion of the study area provides a considerable contrast: the south-facing slopes of the west site at its south end. This steeply sloping area has a similar extent of boulder outcrops, but all are more angular and quite dark. In addition, most soils here are quite ruddy, but still appear to be close to a sandy loam. On color and texture it appears that these boulders are of intrusive igneous, basic (=mafic) material. Additionally, the ruddy soils suggest a high iron content. It appears that these indicators extend off of the site for an unknown distance to the south. These indicators may or may not reflect the presence of gabbroic soil, which often supports specialized plants including some with special status. However, the fact that areas of known gabbroic soils typically lack surface boulders due to the relative ease with which gabbroic rock is said to weather at the surface (Beauchamp 1986; pers. comm., T. Oberbauer, County of San Diego, 2001) indicates gabbroic soils are absent on the study area.

An estimated 5.5 to 6 h (about 12 to 13%) of the study area has a slope of less than 2%; a slightly higher proportion of the west site, compared with that for the east site appears to be relatively flat, but the slopes on the west site also appear to be slightly steeper on average. No substantial areas of cliffs are present, although boulder outcrops are prominent on both sites. Maximum elevation range on the east site is about 97 m, while on the west site it is about 102 m, high and low elevations each being slightly greater on the latter site. Typical slope on the study area as a whole appears to be between 20 and 25%, calculating from a visual estimate of typical elevation isopleth distances within shared slopes (including flat areas). The topography consists of considerable steepness but with smaller areas at top and bottom of slopes relatively flat – often apparently due to past grading for now-abandoned human uses or plans. See the subsection below on observed hydrology for discussion of drainages.

3.2.3 Climate

Much of the information in this section is drawn from Donley et al. (1979). The study area climate is classified as Mediterranean, with hot, dry summers and most precipitation during the moderately cold winter, virtually all in the form of rain. Donley et al. (1979, p.137) defines Mediterranean climates as having, "precipitation more than potential evaporation; summer dry; average of coldest month between 0° and 18°C". Interestingly, by this classification system, areas of San Diego County along the immediate coast are classified as a Steppe Climate, due to the fact that precipitation there is less than potential evaporation, but greater than one half that amount.

For example, the concentration of rainfall toward winter's core is somewhat less strongly pronounced in the San Diego area than in the Los Angeles area (Donley et al. 1979, p. 131). Because of the seasonal rain pattern, rainy seasons are normally measured starting 01 July and ending 30 June. Based on available data (NCDC 2001), the mean annual rainfall has been 35.36 cm (July 1986 - June 2001, not including incomplete data from 3 years). The rainy season peak for the study area vicinity, as for all of cismontane southern California, occurs on average between 20 January and 25 January.

The nearby ocean moderates temperatures at the study area. For example, the San Diego region tends to be drier, yet cooler than the Los Angeles region, probably due to San Diego's relatively broad and uninterrupted coastal plain along the entire county coast. Temperatures below 0°C or above 40°C are unusual, and the study area frequently has hazy to foggy mornings into June and even July. The study area vicinity has about 30 days per year with peak temperatures over 32°C. The low temperature seasonal point is around 10 January, and the average temperature for all of January is just over 12°C. The high temperature peak is in the first half of August, and the average temperature for all of August is about 24°C.

No record of past data for temperatures or wind was found specifically for Lakeside. The study area appears have moderate to mild windiness, peaking in April and late fall, based on the observer's experience in the area and surroundings. For example, in 28 study area visits the maximum wind speeds were 8 to 14.5 kph with occasional gusts to 28.3 kph (late morning, 17 April). Few periods during the current work had winds in excess of 8 kph, even as gusts.

The study area vicinity tends to bear higher concentrations of most air pollutants than do most areas of coastal San Diego County (Donley et al., 1979, pp. 138-141), including particulates, carbon monoxide, hydrocarbons, and (at least in the past), sulfur dioxide and oxides of nitrogen. Oxidants appear to be an exception in this regard, with the pattern reversed.

A very useful and interesting resource on climate (and climate data) in California relative to natural vegetation is provided by Major (1988). Bowman (1973) provides a good overview of climate for San Diego County.

3.2.4 Weather

Weather during the field work was somewhat dry but reasonably typical for the study area. As shown below, rainfall for the season was slightly below normal. Dryness in November and especially December may have provided some adverse effects to native vegetation and thus native wildlife. Dry winters appear to be correlated with a moderate delay in timing of nest initiation in California Gnatcatchers later in the season (pers. obs.). A dry March may have been beneficial in reducing early nest failure for many bird species, however a cold early April including an unseasonal hailstorm may have largely negated any such value for the season as a whole.

Note in Table 3.2-1, below, that 10 of the 12 months during the current rainfall year were approximately normal to dry, while the 2 months (August, October) that were substantially wetter than their recent means are also months in which, together, only 5% of the annual rainfall typically occurs. See Section 3.8.1 for discussion of the local weather during the study work in the context of California Gnatcatchers, and Appendix B for the precipitation raw data from NCDC from which Table 3.2-1 was compiled (in both cm and inches).

3.2.5 Observed Hydrology

The study area is entirely within the San Diego River watershed. Los Coches Creek drains an area to the southwest (e.g., Flinn Springs) immediately below the ridge lines just south of Lake Jennings and El Capitan Reservoir, before flowing north through the canyon that holds the majority of the study area. It continues 2 km to the north and then west before emptying into the San Diego River. The highest extent of tributaries to Los Coches Creek shown on the El Cajon, California USGS map (El Cajon 1975) as a blue line stream is at an elevation of about 546 m. The south edge of the Los Coches Creek watershed boundary forms a small section of the divide between the San Diego River and Sweetwater River watersheds.

Several notable water bodies are in the vicinity. Lindo Lake is a natural lake that has been enlarged and is now contained within a county park; it lies about 1 km to the north, and the north east corner of the east site drains there. Three larger, man-made reservoirs are also in the vicinity. Lake Jennings lies northeast of the study area roughly 2 km, El Capitan Reservoir lies about 12 km north east, and San Vicente Reservoir lies about 8 km to the

north. The San Diego River is also nearby to the northwest about 2 km, and the Sycamore Creek / Santee Lakes area is just under 8 km to the west.

Both sites on the study area are largely within the watershed of Los Coches Creek, but both also have small areas – northeastern portions of the east site and northwestern portions of the west site – which drain directly to the San Diego River.

Numerous small drainages are present on the study area which have potential to be jurisdictional both as waters of the U.S. and as waters of the state. Most or all are less than 200 m in length within the study area and most are ephemeral in hydrology. The most substantial drainage is that along the south boundary of the west site, with a strongly defined drainage channel, but most vegetation appears to be non-hydrophytic; there also appears to be significant siltation from upstream to the west. None of the study area shows strong indications of status as wetlands under U.S. Army Corps of Engineers. There are few hydrophytic plant species on the study area, and those present are typically isolated individuals, mostly scattered along the east edge of the west site, near the concrete channel that is at that point Los Coches Creek.

Table 3.2-1. Current and Typical Rainfall: Lakeside, California*

Month	2000 / 2001 Season (cm)	Typical Mean (cm)	Current as % of Mean
July	0	0.1778	0%
August	0.2794	0.1524	183%
September	0.4826	0.6604	73%
October	2.5908	1.6764	155%
November	0.7366	2.1844	34%
December	0	4.2164	0%
January	9.0932	8.9154	102%
February	10.0584	9.0424	111%
March	4.6736	8.2042	57%
April	3.3782	2.8702	118%
May	0.6604	0.6604	100%
June	0	0.4064	0%
TOTAL	31.9532	35.3568	90.36%

* - All data are from NCDC (2001).

Only one potentially hydric soil is mapped for the study area (Bowman 1973): Tujunga sand. This is present as a narrow strip along the east edge of the west site, toward the north end, and probably reflects the historic channel of Los Coches Creek. Thus, this potentially hydric soil is located where the only (few) willows are found, and that area should be considered a potential, if marginal, wetland until such time as a formal delineation is performed.

Donley et al. (1979) indicates the presence of ground water in the vicinity of the study area. The channelization of Los Coches Creek and stormwater drainage system for the residential area thus could be resulting in a loss of groundwater recharge by the study area's current surface runoff. No indications of springs, seeps, or vernal pools were noted, and the study area appears to have no significant areas of enclosed drainage.

No formal delineation of state or federally jurisdictional waters was performed for the current work. See the Landscape Context subsection, above, for discussion of the study area within the San Diego River watershed. Two excellent references are available relevant to drainage issues at the study area. The older work, Gordon et al. (1992), is an useful introduction to hydrology and fluvial geomorphology for ecologists. The more recent work, Mount (1995), provides background and discussion of natural drainage dynamics in California and the relevant effects of land use and development.

3.3 Soils and Soil Biology

At the highest soil classification level of orders, all study area soils are classified as Entisols. Soils in this broad grouping predominate in San Diego County as a broad north-south band at the eastern lowlands and adjacent foothills (Donley et al. 1979). Entisols are characterized (NRCS 1999) by a dominance of mineral soil materials and a complete or near absence of soil horizons. Entisols can be present in any climate and under virtually any vegetation. The failure of distinct soil horizons to develop can be the result of several situations: the presence of parent materials from which horizons do not form; hard, slowly soluble rock which leaves little residue; insufficient time for horizons to form as in recent deposits of alluvium; development on slopes where the rate of erosion exceeds the rate of horizon formation; or by anthropogenic or other soil alterations. In San Diego County, natural vegetation on these soils is primarily Diegan Coastal Sage Scrub, with some chaparral types.

At lower levels of classification, the study area soils are all within the Cieneba - Fallbrook Association, which are excessively to well-drained coarse sandy loams and sandy loams that have a sandy clay loam subsoil over decomposed granodiorite. They predominantly developed from material weathered in place. The soils are in five series (Cieneba, Fallbrook, Grangeville, Tujunga, and Vista), and eight phases. One, Tujunga sand, is potentially a hydric soil, and appears to be present along the historical path of the Los Coches River. Soils mapped in Bowman (1973) at the study area are shown in Figure 3.3-1 (west site) and Figure 3.3-2 (east site).

A total of 43 soil samples were collected on the study area. This work was beyond the contracted scope, however, the samples (and associated data, including GPS locations) have been retained by Campbell BioConsulting, Inc.

Soil organisms are being increasingly recognized as an important aspect of the ecology of natural areas. While detailed evaluation of the soil organisms is beyond the present scope of work, it is important to realize that the component species present and their ability to flourish, can make a substantial, even critical, difference to the more visible aspects of the natural communities present, as well as to humans through factors such as erosion control. For purposes of this brief discussion, they are divided into biological crusts and subsurface organisms.

3.3.1 Biological Soil Crusts

An excellent resource for understanding biological crusts and their organisms is Belnap et al. (2001). As explained at the beginning of that work, "Biological soil crusts are a complex mosaic of cyanobacteria, green algae, lichens, mosses, microfungi, and other bacteria." They provide a variety of potential services including erosion prevention, decreased runoff (thus increased infiltration) of rainwater, lengthened retention of surface moisture, increased soil temperatures (through a decrease in soil reflectance), nitrogen fixation and other nutrient services, and increased availability of microsites for seed germination and small animal life cycles.

The study area appears to have a patchy cover of biological crusts. Mosses and liverworts are uncommon overall but quite apparent in shaded, moist areas such as the deeper north to east facing canyons on the west site. Patches where they are absent but in otherwise apparently suitable microsites often show signs of soil disturbance through erosion or compaction. Lichens (primarily crustose and squamulose types) are fairly common overall and are most abundant on boulders, but are also locally common on undisturbed, relatively bare, sunny soils. They appeared to be at least as common across the borrow site immediately south of the east site as they were across the study area. Cyanobacteria and green algae are clearly present at least fairly commonly on the study area, however these organisms are not easily evaluated in a general study area survey.

Spike-mosses are transitional as soil crust organisms, but follow many of the same patterns of distribution and support some of the same functions as lichens and algal crusts. Bigelow's Spike-moss, which is fairly common in natural areas across cismontane southern California, is also fairly common on the study area. Mesa Spike-moss, which is much less common and with a more restricted distribution regionally, is near its elevational upper limits

Figure 3.3-1
Study Area Mapped Soils: West Site
MSCP Lakeside Archipelago Lands
San Diego County, California

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Boundary of Study Area

Cieneba: coarse sandy loam (30-65% slopes) C1G2

Grangeville: fine sandy loam (0-2% slopes) G0A

Tujunga: sand (0-5% slopes) TuB

Vista: coarse sandy loam (15-30% slopes) VsE

Vista: coarse sandy loam (30-65% slopes) VsG

Vista: rocky coarse sandy loam (30-65% slopes) VvG

Scale: 1 centimeter = 30 meters (1:3000)

Soil Data Source: Bowman (1973)

Base MapSource: County of San Diego Dept.
of Planning & Land Use 2001
(aerial photo source dated January 1997)

Figure 3.3-2
Study Area Mapped Soils: East Site
MSCP Lakeside Archipelago Lands
San Diego County, California

Scale: 1 centimeter = 30 meters (1:3000)

Soil Data Source: Bowman (1973)

Base Map Source: County of San Diego
Dept. of Planning & Land Use 2001
(aerial photo source dated January 1997)

at the study area. It is present uncommonly, in the least-disturbed shaded canyons of both sites, typically on (apparently) bare, roughly vertical soil surfaces with low levels of disturbance such as erosion.

Biological soil crusts were uniformly absent from trails and otherwise obviously disturbed, graded areas. Their presence in the sage scrub areas seemed to be inversely correlated with the presence of invasive, nonnative plants such as Short-pod Mustard and Tocalote, except in the densest areas of sage scrub growth where these organisms appeared to be limited to lichens growing on shrub stems, presumably due to the highly shaded condition of the soil surface.

3.3.2 Subsurface Soil Organisms

The term zoogeomorphology refers to animals which, through their life cycle, rework significant amounts of the soil. Classic examples are fossorial animals such as earthworms and pocket gophers, but even trampling, wallowing, the dam-building work of Beavers, and rooting (such as that done by feral pigs in California) fall under this heading. A useful review of these organisms and their effects is provided in Butler (1995).

Common earthworms in southern California include both natives and nonnatives (Wood and James 1993). While these organisms are relatively poorly known, it appears that they are normally rare to absent in sage scrubs. This is presumably due to typical soil conditions, with the upper horizon low in organic materials and loam, seasonally hot and dry, and often relatively thin. No earthworms were noted during the current work, including that during collection of 43 soil samples across the two sites. It would be unsurprising if some, especially nonnatives, were found to be present adjacent to residential areas. A general absence of earthworms may make the work of other organisms providing some of the same services, such as mycorrhizal fungi and biological soil crusts, yet more important in sage scrub.

The only pocket gopher species in southern California, Botta's Pocket Gopher (=Valley Pocket Gopher), is common across the study area. However, gopher sign (primarily abandoned burrows) showed a mostly peripheral, distribution. As the observer has noted elsewhere in the region, their sign was most conspicuous near disturbed margins of the two sites, adjacent to residential neighborhoods. Barnes (1973, as cited in Zeiner et al. 1990) apparently found them to be, "most numerous in disturbed areas where forbs and grasses are abundant." One consequence may be that this native rodent actively promotes the influx of ruderal plants through its soil disturbance. These often short-lived, nonnative plants may be relatively vulnerable to root herbivory compared with natives, yet benefit overall from gopher activity due to their competitiveness in disturbed soils and fecundity. If so, this a mutualistic and synergistic relationship that favors increased degradation of native communities once they are initially fragmented.

No effort was made to evaluate smaller soil microorganisms such as mycorrhizal fungi or nematodes. These are on the whole very poorly known groups, especially within native communities of southern California. One implication of this is that any data would be very difficult (at this point) to interpret.

3.4 Vegetation

Discussed in this section are the results of both the development of the floral list and the vegetation mapping work, and preliminary interpretation. See Appendix D for raw data on plant community polygons, and Appendix E for the floral list.

A total of 213 species of plants were confirmed to be present on the study area during the current work. Slightly more species of plants were found on the west site than the east site. This is likely to reflect some combination of the higher number of invasive plant species and slightly shadier drainages holding a variety of uncommon native herbs. About 50% of the species recorded only on one of the two sites are native, while about 72% of those species recorded on both sites are native. This may reflect a relatively lower level of establishment for nonnatives

as a whole, compared with natives as a whole. No special status plants were recorded on the study area during the current work; see Table E2 in Appendix E for a listing of the MSCP covered plants and the likelihood of occurrence judged for each based on study area location, attributes, and observed resources.

Apart from historic aerial photographs (see Section 3.7.1), there is apparently little information on the vegetation of the study area prior to the evaluation of purchase for preservation in 1997. Based on the historic photos, regional-scale information on past vegetation, current soils and climate, and the absence of indicators of differing past communities (e.g., virtually no remnant chaparral shrubs or old shrub bases), it is tentatively concluded that the study area was all or nearly all Diegan Coastal Sage Scrub prior to modern human impacts.

However, it should be recognized that for now this is simply an educated hypothesis. This is important because not all areas that were once sage scrub still are, even where they are within natural communities, and other areas that were once something else are now sage scrub. Thus, this could have ramifications for future study area management and restoration efforts. An important guide for evaluating available evidence on historic condition and subsequent disturbance is Egan and Howell (2001), a new work aimed primarily at community restoration, but also relevant to land managers and to researchers studying assumed "reference ecosystems" which may in fact have had unrecognized historic alterations and disturbance.

Using the methods outlined in Sections 2.1.2 and 2.1.4, above, a floral list was compiled (Appendix E) and the study area vegetation communities were mapped (Figure 3.4-1 and Figure 3.4-2). The following discussions and table are provided as interpretation and extrapolation from that data.

Both sites virtually lack a tree layer. A few gum trees, a single nonnative American Sycamore (with native mistletoe) and other scattered, smaller trees are present, with total species richness in the tree layer for the study area approximately 13 species. Adjacent residential areas are partly wooded, and electrical power lines and poles are present.

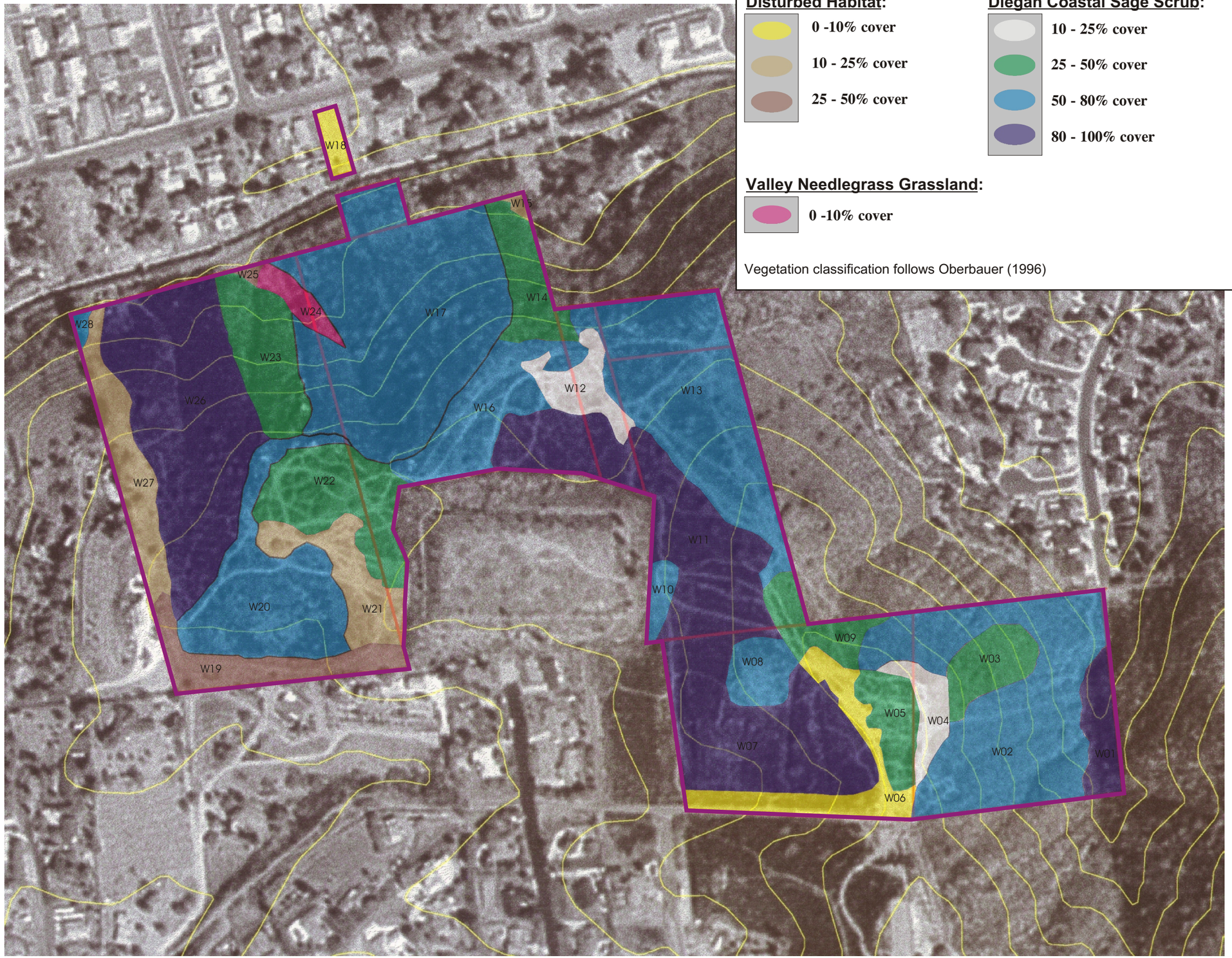
The shrub layer is predominant over the majority of the study area, as can be seen in Figures 3.4-1 and 3.4-2. However, species richness in this layer is not particularly high, with approximately 33 species represented; only a handful of these are dominant over one or more vegetation polygons, and just 2 species (California Buckwheat and California Sagebrush) are clearly the characteristic species across most of the study area.

Healthy sage scrub communities typically show a much greater species richness in the herb layer than do most other shrub communities in southern California, such as chaparrals. When disturbed, this layer nearly always loses much of its species richness, and thus this can provide one indicator of the health of a sage scrub stand. Approximately 166 species, or 78% of those found in the study area, can be classified as herb layer species. This includes most vines, and many in this total are nonnatives. A few species (e.g., mistletoe) were not classified as to vegetation layer for this analysis. Still, this appears to represent a moderately large total, especially considering that the study area is relatively small and uniform, is largely edged by development, and the plant species list was developed while conducting general work within a single year. Thus, the study area appears to retain a considerable portion of its original diversity at this point.

3.4.1 Variation and Classification of Cover

At this time, the study area is predominantly Diegan Coastal Sage Scrub, Coastal form (32510). One polygon, W24, is Valley Needlegrass Grassland (42110; Figure 3.4-1). All remaining areas best fit a classification as Disturbed Habitat (11300) under the Oberbauer (1996) classification. Table 3.4-1 provides a summary of the plant communities analysis on the study area by site, areal extent, and community type.

All Disturbed Habitat polygons on the study area are presumed to have been sage scrub in the past, with one potential exception. That is the flat area at the southwest corner of the east site, which appears to have been the



Disturbed Habitat:

- 0 -10% cover
- 10 - 25% cover
- 25 - 50% cover

Diegan Coastal Sage Scrub:

- 10 - 25% cover
- 25 - 50% cover
- 50 - 80% cover
- 80 - 100% cover

Valley Needlegrass Grassland:

- 0 -10% cover

Vegetation classification follows Oberbauer (1996)

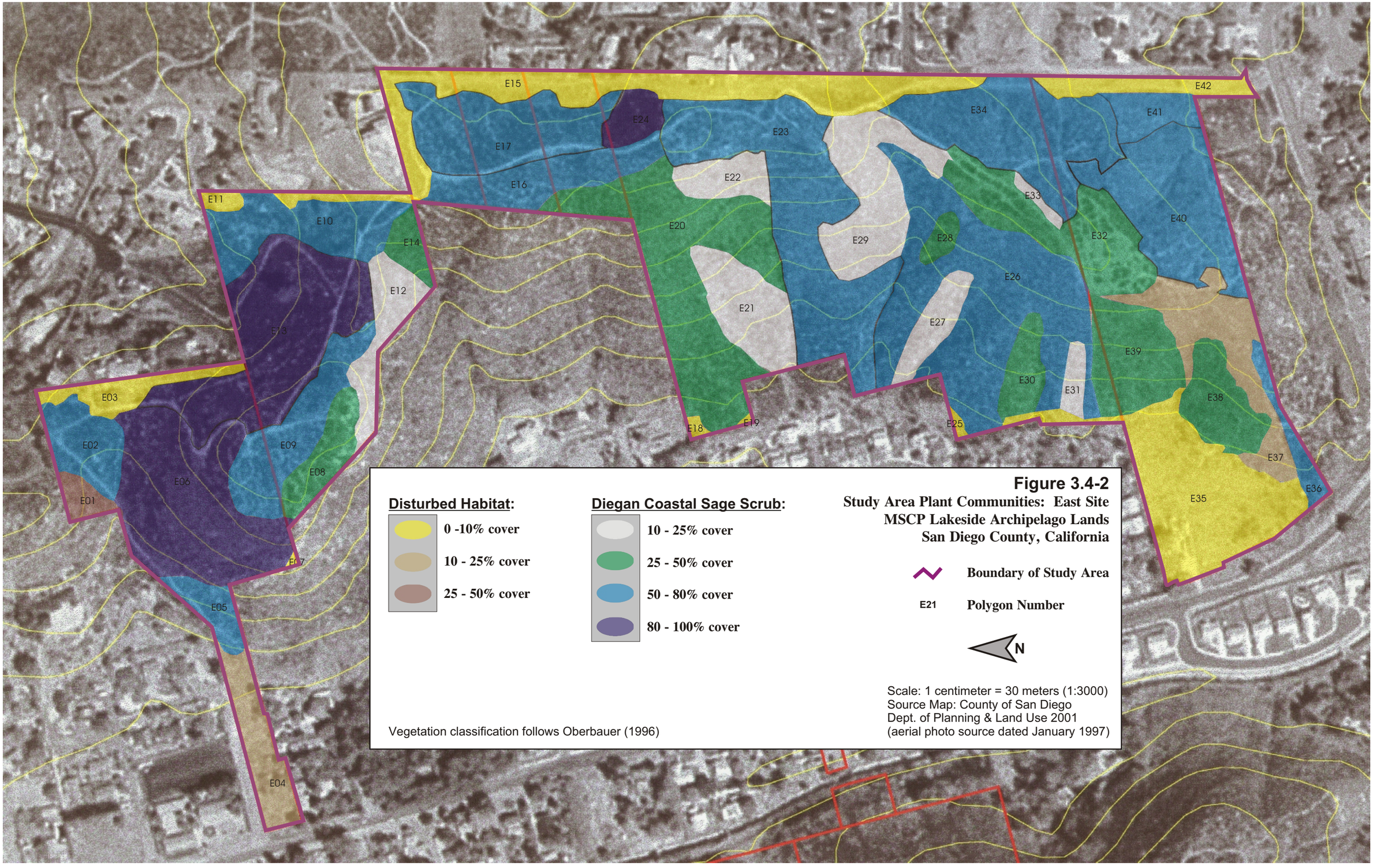
Figure 3.4-1
Study Area Plant Communities: West Site
MSCP Lakeside Archipelago Lands
San Diego County, California

Boundary of Study Area

W13 Polygon Number

N

Scale: 1 centimeter = 30 meters (1:3000)
Source Map: County of San Diego
Dept. of Planning & Land Use 2001
(aerial photo source dated January 1997)



Disturbed Habitat:

- 0 -10% cover
- 10 - 25% cover
- 25 - 50% cover

Diegan Coastal Sage Scrub:

- 10 - 25% cover
- 25 - 50% cover
- 50 - 80% cover
- 80 - 100% cover

Vegetation classification follows Oberbauer (1996)

Figure 3.4-2
Study Area Plant Communities: East Site
MSCP Lakeside Archipelago Lands
San Diego County, California

Boundary of Study Area

E21 Polygon Number

N

Scale: 1 centimeter = 30 meters (1:3000)
Source Map: County of San Diego
Dept. of Planning & Land Use 2001
(aerial photo source dated January 1997)

location of a historic dairy (polygon E35). This 1.42-hectare area was developed for intensive human use more than 73 years ago, based on historic aerial photographs. Given its position on the landscape in or abutting the historic alluvial channel of Los Coches Creek, it may have previously held sage scrub, riparian vegetation, or oak woodland, or some combination of these. It is also likely that this area has been leveled compared to its natural condition, which may have resulted in altered (cut and/or fill) soils.

Table 3.4-1. Summary of Plant Communities on the Study Area

Sites	Area in Hectares	Number of Polygons (Mean Area per Polygon)	Diegan Coastal Sage Scrub		Valley Needle-grass Grassland		Disturbed Habitat	
			Hectares	Percent	Hectares	Percent	Hectares	Percent
West Site	18.78	28 (0.67 h / polygon)	16.81	89.5%	0.1433	0.8%	1.83	9.7%
East Site	27.03	42 (0.64 h / polygon)	22.17	82.0%	0	0.0%	4.86	18.0%
Study Area	45.81	70 (0.65 h / polygon)	38.98	85.1%	0.14	0.31%	6.69	14.6%

The initial lands acquisition review (CDFG 1997) provided estimates for the west site of about 16.6 h and for the east site of about 25.5 h of Diegan Coastal Sage Scrub, or a total of about 42.1 h total (91.9% of the study area). The current plant community classification maps 38.98 h, or about 85.1% of the study area, as this community type. The two estimates for the west site differ by only about 1% of the west site total area, while the east site estimates differ by about 12% of that total area. This discrepancy is probably the result of some combination of the following issues: (1) the original estimate was probably done at a scale and level of accuracy that precluded detailed evaluation of fragmentation while the current evaluation directly addresses it, (2) there may be a difference between the implicit criteria used in the original work and the explicit criteria used in the current mapping (see Section 2.1.4), (3) simple errors may be present in one or both mappings, and (4) the area at first classifiable as sage scrub on the east site may have undergone an actual decline in the roughly 4 year interval due to factors such as an increase in fuel modification zones or ongoing study area degradation.

Soils on the study area, like plant communities, are not strikingly variable. Anecdotally, there does appear to be some small-scale variation in soil texture, color, and chemistry. For example, soils mapped as Tujunga sand along the east edge of the west site support the only willows as well as most or all of the native grassland community on the study area (polygon W24). Small areas of Salt Grass are present on both sites at the bases of the hills adjacent to the old Los Coches Creek channel, about midway between north and south ends. No other strongly halophytic (salt tolerant) plants were noted on the study area.

Soils on southern portions of the west site may have chemistry that differs somewhat from that elsewhere on the study area. The herb layer here differs slightly overall, and areas with low disturbance have increased cover of spineflower and an increased diversity of grasses (native and nonnative). Linear-leaved Stillingia was found only on this portion of the study area and is common within several patches.

The effect of the drainages on study area vegetation is primarily in increasing available microhabitats and thus the overall species richness (see below) rather than holding any different communities, probably reflecting the modest seasonal flows. The slope and aspect (angle) of hillsides exert a conspicuous influence on the growth and relative cover of sage scrub species on the study area. Note, for example, the alternating higher and lower sage scrub cover shown in Figure 3.4-2 on the north- and south-oriented portions, respectively, of the western slopes on the east site.

3.4.2 Dominant Plant Species

The most commonly dominant plant species on the study area are California Buckwheat and California Sagebrush. Both are natives that commonly predominate in coastal sage scrub across southern California. Another 7 species,

5 native and 2 nonnative, and 2 groups composed primarily of nonnatives ("various ruderal grasses" and "various ruderal forbs") are dominant species / species groups within a minority of polygons on the study area. Appendix D lists dominant plants within each polygon as shown in Figures 3.4-1 and 3.4-2. See Section 2.1.4 for methods used to evaluate dominance.

3.4.3 Nonnative Plants

The most conspicuous and widespread nonnative plants on both sites are Short-pod Mustard, Tocalote, and several species of annual grasses. On the study area, these all tend to be at greatest density in areas that show specific signs of past or ongoing disturbance such as fuel modification zones and trails, and/or on the most exposed, driest and sunniest areas. On the latter areas they may reflect higher competitiveness of nonnatives in locations of disturbance from decades past (e.g., grazing or fire). These particular species are also well-known as long-established and nearly ubiquitous weeds in coastal sage scrub throughout southern California.

Table 3.4-2. Status of CalEPPC Invasive Nonnatives on the Study Area

Species	CalEPPC List	Status on Study Area	
		West Site	East Site
Giant Reed	A-1	occasional	absent?*
Hottentot-Fig	A-1	occasional	scarce
Tasmanian Blue Gum	A-1	scarce	scarce
Fountain Grass	A-1	occasional	scarce
Tree-of-Heaven	A-2	occasional	absent?*
Red Brome (*B. madritensis rubens*)	A-2	common	common
Myoporum	A-2	scarce	absent?*
Tocalote	B	abundant	abundant
European Olive	B	scarce	absent?*
Castor-bean	B	occasional	absent?*
Peruvian Pepper-tree	B	occasional	scarce
Brazilian Pepper-tree	B	scarce	absent?*
Cape-Marigold	NMI	absent?*	scarce
Short-pod Mustard	NMI	abundant	abundant
Rough Cat's-Ear	NMI	scarce	absent?*
Tree Tobacco	NMI	occasional	occasional
Monterey Pine	NMI	scarce	absent?*
Russian-thistle	NMI	occasional	fairly common
Slender Oat	AG	common	common
Wild Oat	AG	common	common
Ripgut Brome	AG	fairly common	common
Mediterranean Schismus	AG	fairly common	fairly common

Note: See Appendix E (Floral List) for explanations of codes used in this table.

* - The term "absent?" is meant to indicate that while coverage of the study area was thorough and careful, a few 'hidden' seedlings might have been overlooked, and the unlikely possibility exists that a conspicuous individual might have been missed both in note taking and later data compilation.

See Table 3.4-2 for a listing of the status on the sites and CalEPPC status for all "CalEPPC plants" recorded on the study area. "CalEPPC plants" are those listed in the California Exotic Pest Plant Council's "Exotic Pest Plants of Greatest Ecological Concern in California" (CalEPPC 1999). Note that only 2 of the 22 species recorded appear to be in greater overall abundance on the east site than on the west site. Combining this information with that in Table 3.4-1, above, reveals that while the west site has a lower portion of its total area dominated by nonnative plants, it also has a higher species richness and abundance of the most invasive pest plants on the study area. Other possible contributors to differences between the two sites are differences in past impacts, such as fire, and relative availability of soil moisture and nutrients.

While the west site has substantially less total linear footage of edge abutting non-sage scrub areas than does the east site, there is a potentially important source of invasive plant populations at the west site in the form of the adjacent covered reservoir, which is dominated by ruderal species.

Open space ruderal areas probably pose a much greater threat of nonnative plant impacts on natural communities than do residential areas, under otherwise equal conditions, as ruderal plant communities are populated, by definition, with species that succeed in local conditions without direct aid of mankind. Note also the discussion in Section 3.3.2, above, regarding potential synergistic effects of disturbance-adapted plant species and the native Botta's Pocket Gopher.

Despite additional moisture and locally increased erosion in a dry region, drainages on the study area appear to show a relatively lower cover of nonnative plants compared with more exposed slopes. See Community Dynamics, below, for discussion of fire impacts on vegetation, and note several recommendations (Section 4.1) to address management of nonnative plants.

3.4.4 MSCP-Covered Plants

No MSCP-covered plants were detected on the study area during the current work. See Table E2 in Appendix E for a listing of the estimated likelihood of occurrence on the study area for the 46 MSCP covered plant species, and note the recommendation for gathering further information on study area floristics provided in Section 4.

3.4.5 Community Dynamics

All natural areas have a disturbance regime, or cycle, independent of any anthropogenic effects. Sage scrub plants are typically rather short-lived compared with shrubs in chaparrals, and more often respond to fire by germination than re-sprouting, although there is important geographic variation as well as variation by substrate and other variables (pers. comm. D. Bramlet, consulting botanist, 2001; Westman and O'Leary 1986). One effect of fragmentation through urbanization can be alteration of these natural regimes.

Fire appears to be a natural process within coastal sage scrubs. However, altered fire patterns (frequency, seasonality, temperatures, etc.) may adversely affect the natural community. This can strongly promote invasion by nonnative plants, especially annual grasses. For example, a rapid series of fires over several years can result in type conversion from sage scrub to annual grassland as the native seed bed is depleted and conditions are altered that competitively favor grasses. Conversely, fire suppression over decades in sage scrub may result in only moderate invasion by nonnatives, development of excessive deadwood, and a reduced viable seed bed, and reduced stem growth of native shrubs. This situation in turn would make the community more vulnerable to a hot fire driven by excessive fuels, followed by promoted invasion from nonnatives due to a depauperate native seed bed and increased soil nitrogen. Thus, while shortened and lengthened fire regimes may create different initial effects or "field marks", the long term result (sage scrub loss through altered fire regime) may be the same. This may be in part an issue of whether a particular open space surrounds development (e.g., increased fire rates at edges) or development surrounds the open space (e.g., suppressed fire rates).

Evidence at the study area, along with available information on fire history, suggest that none of the east site and only the southern end of the west site have burned in the last several decades to 100 years. This condition is sometimes referred to by land managers as "senescent sage scrub", though precisely how such areas are affected (net productivity, biological soil crust, and invertebrate community changes) has apparently not been formally studied. Anecdotally, native shrub seedlings appeared to be abundant as fringes to many areas of dense shrub growth and under more open shrubs such as Broom Baccharis, but actual recruitment is uncertain. See Section 3.8.4, under "Impact Buffering" for discussion of the observed condition of the study area with regard to fire effects.

3.5 Invertebrate Animals

Evaluation of invertebrates as a group for a natural area is, at the current levels of knowledge, highly problematic. Few biologists have the expertise to conduct accurate surveys for more than a few of the many groups, and such work is very labor intensive when available. Further, the limited existing knowledge of these

potentially important groups of animals (beyond taxonomy) precludes or at least hampers interpretation of results in a useful way for evaluation or management of preserved lands.

Nevertheless, careful, anecdotal information gathered on these species has the following potential values: (1) it provides a minimal reference inventory and thus some limited basis to gauge the likelihood that future data do or do not reflect changed conditions, (2) the record that particular native or nonnative species were present may allow improved evaluation of changes in their status over time, and (3) such a record may in the future also provide valuable information about the study area as it was now, given information developed in the future on correlations between the presence of certain species and study area conditions. This latter data might guide management decisions such as prioritizing among study areas for particular actions.

See Appendix F for a listing of morphospecies detected on the study area, along with a discussion of the use of morphospecies. No collecting of animals was performed. Invertebrates were addressed only within the general reconnaissance work for the reference inventory. Macroinvertebrates (those over 1 to 2 mm in length) when detected on the study area were anecdotally identified to morphospecies in the field and this (or a description) was recorded in field notes. See Appendix F for further discussion of references. As indicated in Section 3.3.2, no effort was made to address microinvertebrates (those less than about 1 to 2 mm in length).

The total number of morphospecies identified as present on the study area during the current work is conservatively estimated at 118, with 87 of these on the west site and 99 on the east site. This represents 17 orders of invertebrates from 5 classes and 2 phyla. Of this total, 85% (100 morphospecies) are insects; 12% (14 morphospecies) are beetles. Nonnatives total in the range of about 12 to 25 morphospecies (10 to 21% of the total); this range is due to uncertainties both in identification and origin.

These totals greatly under-represent the actual diversity of invertebrate animals expected on the study area, due to the limitations of the methods and level of effort used as well as the fact that the work was performed by a non-specialist. The list is provided to document occurrence of potentially interesting or significant taxa, to give some sense of what was observed during the current work, and to demonstrate a means by which invertebrates can be reported using identifications to varied taxonomic levels and across multiple sites.

3.5.1 Nonnative Invertebrates

Noteworthy were the following nonnative invertebrates detected on the study area: Brown Garden Snail (mainly on the periphery of the two sites and in early spring), terrestrial isopods (mainly peripheral), silverfish (mainly peripheral), at least 2 species of earwigs (only peripheral), Yellow Jacket (uncommon and widespread), Argentine Ants (very common peripherally, rare elsewhere), Honey Bee (fairly common and widespread; active hive in adjacent borrow pit), Cabbage White (common and widespread), and both Red Gum Lerp Psyllid and Eucalyptus Long-horn Borer (both restricted to the few gum trees on the sites).

These observations suggest that the study area is undergoing significant impacts from invasive, nonnative invertebrate generalists supported by changes in adjacent development and other disturbances on the study area. The data do not allow an evaluation of whether the study area is actively in conversion to highly disturbed, remnant sage scrub with depleted native plant and animal communities, or is instead still resistant to invasion and degradation with the observations reflecting largely ineffective overflows from developed areas with as yet no potential to effect any substantial conversion of the two sites.

3.5.2 Native Invertebrates

Brief discussions are provided for the following 7 skippers and butterflies of special concern in San Diego County. Biology information is primarily from CNDDB (CDFG 2001c) and Opler and Wright (1999). Most are tracked by the CNDDB (CDFG 2001c), and 2 (Thorne's Hairstreak and Wandering Skipper [=Salt Marsh Skipper]) are MSCP covered species.

- Harbison's Dun Skipper (*Euphyes vestris harbisoni*): Unrecorded; no potential for occurrence on the study area. Larval foodplant is sedges, habitat is lowland moist areas near streams, marshes, and swales. No sedges were detected on or immediately adjacent to the study area.
- Wandering Skipper (*Panoquina errans*): Unrecorded; no potential for occurrence on the study area. Larval foodplant is Salt Grass, which is occasional on both sites, but the species is restricted to southern California salt coastal marshes.
- Quino Edith's Checkerspot (=Quino checkerspot butterfly; *Euphydryas editha quino*): Unrecorded; potential for occurrence on the study area is considered very low, although no protocol surveys were performed. The primary larval foodplant, Dwarf (=California) Plantain, as well as Purple Owl's Clover (one of two known secondary larval foodplants) are present locally in modest amounts on the two sites, primarily along lower slopes adjacent to residential yards and/or fuel modification zones.
- Thorne's Hairstreak (*Callophrys thornei*): Unrecorded; no potential for occurrence on the study area. Larval foodplant is Tecate Cypress (*Cupressus forbesii*), which is absent on or near the study area.
- Hermes' Copper (*Lycaena hermes*): One individual recorded on the study area at the south end of the west site, at the larval foodplant (Spiny Redberry). May be present in adjacent areas in greater numbers.
- Monarch (*Danaus plexippus*): Unrecorded during the current work. Potential for at least occasional wanderers of this widespread migrant is considered high. The similar Queen was fairly common on both sites during the current work, and one Monarch was noted near the study area. The only plant species noted on the study area that is in the group of species used by this butterfly as a larval foodplant (milkweeds) is Hartweg's Milkvine, which was scarce on the west site and occasional on the east site.
- Variegated Fritillary (*Euptoieta claudia*): One individual recorded on the east site. This species is listed as among, "those that are rare and are likely to be seen in limited capacity" in San Diego County (Klein 2001), and Emmel and Emmel (1973) describe it as a, "rare capture in southern California". Foodplants are rather variable, and said elsewhere to include passionvine (*Passiflora* spp.), flax (*Linum*), violets (*Viola*). and others (Emmel and Emmel 1973). The only plant in these genera noted on the study area is Johnny Jump-Up (*V. pedunculata*), which was occasional on both sites. Interestingly, the Variegated Fritillary was noted only a few dozen m south of the main concentration of this wildflower on the east site, although: (1) plants in the other two genera (*Passiflora* and *Linum*) are frequently planted as ornamentals (and both are known to naturalize readily), and (2) there is said to be one species of *Linum* (*L. lewisii*) native to and frequent in montane San Diego County (Beauchamp 1986).

Other native invertebrates included an apparent diversity of spiders, Tenebrionid beetles (quite common), many harvester ants (primarily of one morphospecies), tarantula hawks (and at least one tarantula), Jerusalem crickets, many termites, ant lions, velvet ants, native (solitary) bees, and many others.

The array of native surface invertebrates on the study area appears to support a conclusion that this community on the study area may still be relatively intact. Also anecdotally, and given the level of effort, the butterfly community appears to be reasonably intact, using as a basis observations of other natural communities in southern California with varied levels of disturbance.

3.6 Vertebrate Animals

Data on vertebrates was gathered through general reconnaissance work, avian point counts, and anecdotally during other tasks such as vegetation mapping. Thus comments that follow on study area conditions, use by wildlife, and species richness are in part based on direct observation and in part on a limited but quantitative data set. See Table 3.6-1, below, for list of the vertebrates recorded. See Appendix G for a complete list of all vertebrates recorded or expected on the study area along with study area status and regulatory status, and Appendix H for all avian point count data.

Table 3.6-1. Vertebrates Recorded on the Study Area

Pacific Chorus Frog	Pacific-slope Flycatcher	Western Tanager
Western Banded Gecko	Black Phoebe	Spotted Towhee
Granite Spiny Lizard	Say's Phoebe	California Towhee
Western Fence Lizard	Ash-throated Flycatcher	Rufous-crowned Sparrow
Side-blotched Lizard	Cassin's Kingbird	Chipping Sparrow
Coast Horned Lizard	Western Kingbird	Song Sparrow
Western Skink	Warbling Vireo	Lincoln's Sparrow
Orange-throated Whiptail	Western Scrub-Jay	White-crowned Sparrow
Western Whiptail	American Crow	Golden-crowned Sparrow
Southern Alligator Lizard	Common Raven	Black-headed Grosbeak
Striped Racer	Northern Rough-winged Swallow	Blue Grosbeak
Gopher Snake	Cliff Swallow	Lazuli Bunting
Turkey Vulture	Barn Swallow	Western Meadowlark
Mallard	Bushtit	Brown-headed Cowbird
White-tailed Kite	Cactus Wren	Hooded Oriole
Sharp-shinned Hawk	Bewick's Wren	Bullock's Oriole
Cooper's Hawk	House Wren	House Finch
Red-shouldered Hawk	Ruby-crowned Kinglet	Lesser Goldfinch
Red-tailed Hawk	Blue-gray Gnatcatcher	House Sparrow
American Kestrel	California Gnatcatcher	Virginia Opossum
Merlin	Western Bluebird	Audubon's Cottontail
California Quail	Hermit Thrush	California Ground Squirrel
Rock Dove	Wrentit	Botta's Pocket Gopher
Mourning Dove	Northern Mockingbird	Deer Mouse
Greater Roadrunner	California Thrasher	Black Rat
Common Poorwill	European Starling	Coyote
Black-chinned Hummingbird	Cedar Waxwing	Domestic Dog
Anna's Hummingbird	Phainopepla	Common Gray Fox
Costa's Hummingbird	Orange-crowned Warbler	Striped Skunk
Rufous / Allen's hummingbird	Yellow Warbler	Domestic Cat
Nuttall's Woodpecker	Yellow-rumped Warbler	Bobcat
Northern Flicker	Wilson's Warbler	Domestic Horse

A total of 96 species of vertebrates was documented to be present on the study area during the current work. This total does not include one apparently extirpated species (Desert Woodrat). Full details of status on the sites, regulatory status, and scientific names, are provided for all recorded and expected species in Appendix G. Site totals are 76 species on the west site and 80 species on the east site. Sixty of the species, or 63%, were recorded on both of the two sites. Eight of the species recorded on the study area, or about 8%, are nonnative. This total includes all feral and domesticated species found as well as established nonnatives.

Nineteen vertebrate species unrecorded during the current work are judged to have a high probability of occurring on the study area. Nearly all can be categorized as migratory birds or nocturnal mammals. Another 32 unrecorded species have an intermediate likelihood of occurrence; for most of these, the study area is of marginal or indeterminate suitability. Finally, 22 species are judged to have a low but still reasonable potential to occur; evidence weighs against these species individually, although it is likely that a few from this group are present due to the uncertain nature of such evaluations.

As discussed in Section 3.2.4, weather during the current field work was at near normal moisture levels to slightly drier and more variable than average. Thus we anticipate that for most species this was a substantially typical year with regard to effects from weather.

3.6.1 Fishes

No potential habitat for fishes was present on the study area during the current work. Nearby portions of Los Coches Creek may have some permanent pools, but do not have year round flows at this time. In the past Los Coches Creek may have had native fish, and currently some nonnative fish (e.g., Western Mosquitofish, *Gambusia affinis*) may still be present. It is unlikely that it regularly had native fish in the past, if it was indeed an intermittent stream as shown on the USGS map (El Cajon 1975, Moyle 1976), but if it did, that would probably have indicated the presence of resources that would support an increased species richness of the otherwise dry upland study area.

3.6.2 Amphibians

Only one species of amphibian was recorded on the study area during the current work. The native Pacific Chorus Frog (= Pacific Treefrog) was found to be uncommon on both sites. Two other species, Pacific Slender Salamander and Western Toad, are judged to have a reasonable and intermediate likelihood of occurrence on both sites in modest numbers. The low diversity of recorded amphibians is a result of the study area being almost entirely upland and now cut off from easy movement to and from Los Coches Creek due to urbanization and flood controls. No additional amphibians were recorded during cursory examinations of adjacent Los Coches Creek, but habitat appeared potentially suitable for several species, including the nonnatives Bullfrog (*Rana catesbiana*) and African Clawed Frog (*Xenopus laevis*). No special status species are expected to occur (Stebbins 1985, Zeiner et al. 1988, Jennings and Hayes 1994).

3.6.3 Reptiles

Eleven species of reptiles were recorded on the study area during the current work. Given the resources and conditions present, an additional 11 species are judged to have at least a reasonable potential to be present but were not detected during the current work.

Special status reptiles detected on the study area are Coast Horned Lizard, Western Skink, and Orange-throated Whiptail. Coast Horned Lizard was found to be fairly common on the southern third of the east site and the adjacent borrow site area. A single Western Skink was also noted in the southern portion of the east site. Orange-throated Whiptail was noted as quite common over substantial portions of both sites. Recently published research indicates that the northern subspecies of Orange-throated Whiptail (the taxon with special status) shows no indication of population decline and does not meet any reasonable criteria for any special status (Brattstrom 2000). This information should be corroborated before assuming the species' status does not warrant concern. See Figures 3.8-3 and 3.8-4 in Section 3.8.2 (Other Special Status Species) for locations of these species.

Interestingly, only 2 of the 11 observed species are snakes. Both Striped Racer and Gopher Snake are uncommon to rare on the study area. Both are common in sage scrub regionally and currently lack special status. Striped Racer primarily eats lizards, while Gopher Snake certainly has the broadest dietary habits of any snake in the region. Thus no snakes that rely heavily on mammalian prey were detected. Even for the two species noted, only 3 observations of each were made during the 160 hours of field work. The near absence of snakes, including any rattlesnakes, may be a chance "hole" in the data, or it may reflect a real phenomenon. Note that while the lizards present feed primarily or only on invertebrates, snakes of the region in contrast feed primarily on vertebrates, have a generally greater mass, and larger home ranges. Thus they may be relatively more sensitive than lizards to changes in a vertebrate prey base (e.g., rodent populations), or to isolation of the study areas from other open space. Additionally, snakes may suffer impacts disproportionately at urban edges due to being targets both for capture as pets and for killing as perceived threats.

No nonnative reptiles were observed or are expected on the study area, based on the available resources. Sources for information on and conclusions regarding reptiles is drawn primarily from Stebbins (1985), Zeiner et al. (1988), and Jennings and Hays (1994), and to lesser degrees from dozens of other sources as well, including several personal communications with knowledgeable herpetologists.

3.6.4 Birds

Data for birds at the study area are presented under four subheadings, below: Avian Point Count Results, General Comments, Special Status Birds, and Nonnative Birds. See also Appendix G for the vertebrate faunal listing including study area status, special regulatory status, and scientific names for each species.

Avian Point Count Results

As detailed in Section 2.1.3, ten-minute avian point counts were conducted at each of ten stations, monthly from March through July, 2001. See Figure 3.6-1 for station locations. All counts were conducted by the author. Tables 3.6-2 and 3.6-3, below, provide quantitative summaries of the results among species and individuals.

Table 3.6-2. Avian Point Counts: Totals for Individuals*

Month	Point Count Stations										Total # of Individuals	Mean # of Individuals
	1	2	3	4	5	6	7	8	9	10		
March	32	28	20	17	29	50	33	9	40	18	276	27.6
April	20	21	29	17	17	23	20	14	22	21	204	20.4
May	19	37	23	18	20	65	28	10	19	14	253	25.3
June	22	42	39	19	27	27	33	22	21	22	274	27.4
July	12	39	38	51	23	63	50	25	65	35	401	40.1
Total # of Individuals	105	167	149	122	116	228	164	80	167	110	1408	
Mean # of Individuals	21	33.4	29.8	24.4	23.2	45.6	32.8	16	33.4	22		28.16

*-See discussion below regarding the incorporation of individuals recorded as "Fly-bys", which may cause the above totals not to appear to add correctly in conjunction with the raw data (Appendix H).

Table 3.6-3. Avian Point Counts: Totals for Species*

Month	Point Count Stations										Total # of Species	Mean # of Species
	1	2	3	4	5	6	7	8	9	10		
March	11	11	11	6	8	17	12	5	14	11	30	10.6
April	10	11	13	4	11	10	11	8	10	12	28	10
May	9	13	12	8	8	16	17	8	9	9	31	10.9
June	11	10	12	8	11	12	13	12	12	10	26	11.1
July	9	12	11	9	10	13	13	7	12	15	30	11.1
Total # of Species	20	24	22	14	20	29	28	17	22	23	49	
Mean # of Species	10	11.4	11.8	7	9.6	13.6	13.2	8	11.4	11.4		10.74

*-See discussion below regarding the incorporation of individuals not identified to species, which may cause the above totals not to appear to add correctly in conjunction with the raw data (Appendix H).

Anecdotally, the abundance and species richness observed during the avian point counts appear to be fairly typical for relatively uniform sage scrub sites in southern California. Point station 6 had both the highest average number

Figure 3.6-1
Study Area Avian Point Count Stations
MSCP Lakeside Archipelago Lands
San Diego County, California

8 **Point Count Station**
(50 m radius)

N

Scale: 1 centimeter = 50 meters (1:5000)
Base Map Source: County of San Diego
Dept. of Planning & Land Use 2001
(aerial photo source dated January 1997)

of individuals and highest average number of species for the 10 stations, while station 8 had the lowest average number of birds and second lowest number of species. It is not obvious why either should be the case, although station 6 was relatively close to an edge of the study area and may have benefitted from having birds of both sage scrub and open residential habitats, while station 8 was a relatively interior location, overlooking a large, moderate slope of fairly uniform Diegan Coastal Sage Scrub.

The current point count data are believed to have the following important limitations, reflecting the limited time available for this task under the current scope of work:
(1) A small sample size, consisting of 10 stations with 10-minute counts, or 100 minutes per set, and 5 replications, for a total of 500 minutes. As noted in Ralph et al. (1995), generating a sample size that will allow reasonable precision in characterizing the birds of a given area will typically require at least 5-minute point counts among 30 stations without replications (i.e., 150 minutes).
(2) The limited size and the configuration of the two sites necessitated some inclusion of off-site areas within the 50-m radius area, and even the on-site areas surveyed were sufficiently close to the site edges that they are expected to be importantly influenced by various edge effects. Indeed, the farthest one can go from a site edge within the study area is about 150-m, and the mean distance is probably well under half of that.
(3) The time period of the study was only five months, within a single year.

However, the data remain useful both in combination with and a basis of comparison with future counts on the study area, and with counts conducted elsewhere to evaluate species trends and study area conditions.

The 6 species most reliably encountered during the point counts, with percentage of counts included, are: Northern Mockingbird (98%), California Towhee (94%), House Finch (92%), Western Scrub-Jay (72%), Wrentit (72%), and Mourning Dove (70%).

The 5 species with the highest mean number of individuals recorded per point count (including in averages any counts of zero) are: House Finch (5.14/count), Mourning Dove (3.04/count), Northern Mockingbird (2.38/count), Cliff Swallow (2.26/count), and California Towhee (2.18/count).

Importantly, results are not adjusted for variation in detectability. All of the above species are relatively conspicuous birds visually, by sound, or both. However, Northern Mockingbird would probably have the highest detectability among these species, if this were quantified, as they are both highly vocal and highly visible throughout the time of year when the field work was conducted. Thus, incorporating detectability and ranking by estimates of true abundance would probably lower the relative standing of some of these species compared with that of others recorded, although these species were clearly all common during the field work.

Although detectability is an important issue, it cannot be entirely quantified due to the many contributing factors such as site acoustics, acoustical abilities, experience, and focus of observers, time of year, weather, and others. This issue highlights that point counts should not be interpreted to provide actual population numbers. Instead, the strength of avian point counts, and most other systematic, quantitative sampling methods for wildlife, is the utility for indicating changes across time.

California Gnatcatchers were detected on a total of 4 of the 50 point counts and at 3 of the 10 stations, always as single individuals. Other special status birds recorded on the point counts are White-tailed Kite, Cooper's Hawk, Yellow Warbler, and Rufous-crowned Sparrow. For all of these species, sample sizes are too small to provide any meaningful quantitative analysis.

General Comments
See Section 3.8.1 for discussion of California Gnatcatcher results. Because there is neither open water nor clearly wetland habitats, the study area lacks potential habitat for the many species of ducks, shorebirds, and marsh birds in the area. However, Great Blue Herons, White-faced Ibis, Mallards and others were among the species noted

commuting overhead during the current work. Mallards will often attempt to nest in sage scrub in the vicinity of lakes, and at least one instance of an apparent pair of Mallards landing on the study area was recorded. They are not expected to nest successfully due to the presence of a varied predator community.

A variety of birds of prey were recorded, and others are expected to occur occasionally. For example, an Osprey was noted early in the season carrying a fish over the study area, but Ospreys are unlikely to utilize any study area resources. Five raptor species are believed to have a substantial likelihood of using the study area during the nesting season:
(1) Cooper's Hawk (one pair attempted to nest in a gum tree just southeast of the west site, and foraged on that site, but their nesting was probably not successful based on the lack of observations of young and the early disappearance of the adults),
(2) Red-tailed Hawk (confirmed fledging young from a nest on the west site in a large gum tree at the north end, and foraging on both sites),
(3) Red-shouldered Hawk (an adult and a juvenile were seen intermittently at the southeast corner of the east site, and they probably nested in oaks off of the site but in the vicinity),
(4) American Kestrel (a male and a female foraged occasionally in the northeast portion of the east site, and apparently nested some distance to the east; no young were noted), and
(5) Great Horned Owl (1 was noted in a gum tree just east of the southeast corner of the east site; they probably nested in dense trees near the site).

While not raptors per se, it appears that both Western Scrub-Jay and Northern Mockingbird utilize the sites and adjacent residential areas for foraging and probably benefit from the urban interface. Both are known predators of a wide variety of bird nests, although existing data suggests that this may be a much more serious problem with scrub-jays than by mockingbirds.

Migrant numbers and species richness appeared rather low compared with expectations, but this could be a result of the somewhat dry conditions, the lack of diverse natural communities, or simple random variation either in study area use by the birds in the study period or in data gathering.

Species richness of breeding birds appears about as expected given the food and nest site resources available. Virtually no hole-nesting habitat is available on the study area, and hole nesters such as woodpeckers and Western Bluebird were present mainly as peripheral species due to adjacent resources in developed areas. The crevice-nesting Rock Wren is absent, perhaps due either to the many rock outcrops on both sites being too limited in size, or because of specific or general predation pressures, or for some unrecognized reason.

The presence of California Quail, Spotted Towhee (formerly Rufous-sided Towhee), and Rufous-crowned Sparrow may provide a good indicator with regard to limited levels of mammalian nest predation on the study area, as all are generally ground nesters, thus potentially vulnerable when high levels of predation are present. They tend to disappear quickly on most developed lands such as residential areas (pers. obs.). Horned Lark, another ground nesting bird with potentially suitable habitat on the study area, is absent. Habitat is probably not suitable on the study area for either of 2 other ground-nesting birds present in the region: Grasshopper Sparrow or Western Meadowlark. On a study of local extinctions in habitat islands in San Diego shrub lands (Soulé et al. 1988), one of the most vulnerable birds to degradation or isolation of habitat islands appeared to be California Thrasher. These thrashers are present in fairly good numbers on both sites in the current study area.

Special Status Birds
A total of 9 bird species with special status were recorded on the study area during the current work, and another 7 were judged to have at least some reasonable likelihood of occurrence. The 9 species recorded are: White-tailed Kite, Cooper's Hawk, Sharp-shinned Hawk, Merlin, Cactus Wren, California Gnatcatcher, Western Bluebird, Yellow Warbler, and Rufous-crowned Sparrow.

Only 2 of those species, California Gnatcatcher and Rufous-crowned Sparrow, are expected to breed within the study area boundaries. See Section 3.8.1 for specific information on California Gnatcatchers. Areas where Rufous-crowned Sparrows were detected are addressed in Section 3.8.2 and associated figures. The west site holds an estimated 4 to 8 pairs of Rufous-crowned Sparrows, while the east site holds an estimated 3 to 9 pairs; additional pairs are present just off of the study area, and perhaps half of those on the study area have home ranges extending partly off of it. Cooper's Hawk, Cactus Wren and Western Bluebird probably nest in the immediate vicinity and forage inside the boundaries occasionally, but only single pairs of the first 2 and about 3 pairs of the latter species were noted in the vicinity. Sightings of 1 to 3 individuals each of White-tailed Kite, Sharp-shinned Hawk, Merlin, and Yellow Warbler refer to non-breeding individuals. There is a low but reasonable potential for White-tailed Kite to breed on the study area, but no reasonable potential for the other 3 species to breed based on habitat requirements and distribution. In addition, 3 special status species were recorded flying over the study area, but are not expected to utilize study area resources: Double-crested Cormorant, White-faced Ibis, and Osprey.

Brown-headed Cowbird, an obligate brood parasite that includes California Gnatcatcher in its large list of host species, was apparently present only as a migrant and wanderer on the study area. Sightings of 1 to 4 individuals, mainly males, were recorded on or over the study area on 6 dates from 04 April through 08 May, but most of these were birds simply flying over the study area at an appropriate time of year for migrants. Two very young juvenile cowbirds were noted just off of the southeast end of the east site on 23 July, in residential neighborhood trees, and were assumed to have fledged off of the study area.

Several special status bird species associated in part with coastal sage scrub in southern California are currently absent from the study area, Horned Lark, Loggerhead Shrike, and Sage Sparrow. There appears to be moderate to marginal habitat for both Horned Lark and Loggerhead Shrike. The local subspecies of Sage Sparrow is a special status species that utilizes sage scrub and chaparral in the region, and appears to be most common in shrub lands where the herb layer is open (leaf litter appears to be fine), the shrub layer is relatively uniform and continuous, the underlying herb layer is relatively open, and soils are often sandy (pers. obs.). It appears to be relatively sensitive to habitat fragmentation issues, often disappearing relatively early in this process compared with other vertebrates (pers. obs.; pers. comm. J. Lovio, U.S. Navy, 2000). The species is clearly absent at this time from both sites. However, its absence on the study area may be due either to the fragmentation of potential habitat in the area, or because the study area does not provide all habitat requirements.

One pair of Cactus Wrens was recorded adjacent to the study area. They were recorded once on the study area and were primarily located just off of the east site. The Coast Prickly-Pear they utilized was present in several small patches mostly off of the study area, toward the northwest end of the east site in adjacent open space. They spent considerable time during the spring in nest construction, but young were not observed. The pair's isolation from other Cactus Wrens (no others were detected in the immediate vicinity) may lead to extirpation from the immediate vicinity, or perhaps the site will be sporadically occupied if Cactus Wrens can occasionally find this habitat patch. The species is present relatively short distances to the east, in more extensive habitat.

As mentioned at the end of the discussion on avian point counts, above, only a small amount of data on special status birds was generated by the avian point counts (see Appendix H for point count data). Five such species were so recorded. Single California Gnatcatchers were noted on 4 point counts: station 10 in March, stations 3 and 8 in May, and station 10 in July. Rufous-crowned Sparrow was recorded (1-2 individuals) at station 10 in April, stations 1, 3, 4, and 10 in May, and Stations 4, 5, and 10 in June. One White-tailed Kite was recorded, at station 5 in July. Cooper's Hawk was recorded once, a single bird at station 6 in April. Finally, a single Yellow Warbler was recorded at Station 10 in April. These counts together represent just over 1 percent of all individual detections on the point counts, but about 10 percent of the species richness.

Nonnative Birds
European Starlings, nonnatives common in southern California, are obligate hole nesters and often aggressively usurp nest holes from native species. Because there are virtually no nest sites for hole nesters on the study area, they are not expected to be present as a nesting species of any significance. However, they were confirmed nesting adjacent to both sites in neighborhoods, and foraged in modest numbers on the study area.

The nonnative Rock Dove has a similar status, nesting in neighborhoods and was frequently seen overflying the study area (including with nest material) and foraging on the study area very occasionally.

House Sparrows were found to be fairly common at the periphery of both sites, foraging primarily 50 m or less onto the sites and common in adjacent neighborhoods.

The neighborhood between the two sites held a winter flock of about 50 Lilac-crowned Parrots that dispersed around March, with most birds departing the vicinity although a few remained in wooded areas between the sites. This native of west Mexico is a fairly common cage bird, and may be breeding in cismontane southern California in small numbers due to survival of escaped individuals. As noted in del Hoyo et al. (1997) regarding the native range, its, "[o]ccurrence in flocks outside breeding season suggests some wandering; presence in lowlands believed to be chiefly or only in winter." This is apparently a fruit-eating species and a non-colonial hole-nester in oak-pine woodlands at mid-elevations within the native range.

A single Cockatiel was noted as a fly-by during point counts, and Common Peafowl as well as domestic chickens and ducks are common immediately surrounding the study area. These are probably at least an occasional source of food for area predators such as Coyote, Bobcat, Gray Fox, dogs, and cats.

3.6.5 Mammals
Data for mammals at the study area are presented under four subheadings, below: General Comments, Predators, Special Status Mammals, and Nonnative Mammals. See also Appendix G for the vertebrate faunal listing including study area status, special regulatory status, and scientific names for each species.

General Comments
Current field work resulted in definite records of 12 species of mammals on the study area, not counting humans (see 3.2.6 for humans). While it is certainly the case that some additional mammals are expected to be present, especially rodents and bats (see Appendix G for details on detected and expected species), the data appear sufficient to generally characterize the suite of mammalian species that use the study area.

Potential roost habitat for several species of bats is present on both sites, although no guano was noted and the largest cave-like spot (present on the west site) is heavily disturbed with graffiti and trash. Actual use of the study area by bats can probably only be determined through focused survey work.

Audubon Cottontail (=Desert Cottontail) is fairly common on both sites; this abundant rabbit prefers cover of intermediate density, such as that on the study area. Black-tailed Jackrabbit typically requires a mix of open areas with good forage (e.g., grasslands) and adjacent areas with moderate to heavy shrub cover; thus potential habitat on the study area is marginal, and the species was not recorded. Brush Rabbit, the third leporid in coastal southern California, is almost completely restricted to areas of very dense shrubbery (e.g., extensive chaparral and only rarely sage scrub), and is considerably shier and more strictly nocturnal than the other 2 species. Young Audubon's Cottontails (present throughout the year in this region) can be quite difficult to distinguish from Brush Rabbits. Importantly, none of the 3 species constructs substantial burrows, thus none have requirements for fissible soils (pers. obs., Orr 1940, Ingles 1965, Burt and Grossenheider 1976, Zeiner et al. 1990).

Rodents, as a whole, are quite common on the study area. However, it appears this may be a function of the high abundance of Botta's Pocket Gopher (=Valley Pocket Gopher). See Section 3.3.2 for discussion of this disturbance-adapted species and possible community effects. Sign of other rodents appeared moderate to low and did not show signs of diversity. For example, no clear sign of kangaroo rats (e.g., tail drags, dust bath sites, and characteristic scat) were found on either site. A single Deer Mouse was noted, apparently the remains of a recent predator kill.

No sign of Dusky-footed Woodrat was noted on either site despite careful searching. However, the study area no longer has direct connection with Los Coches Creek and thus appears to hold only marginal to unsuitable habitat for this species due to the relative inaccessibility of water (or at least dew and deep shade) during dry months. An old, abandoned midden characteristic of Desert Woodrat was found in boulders on the west site, and an active midden of this species in Coast Prickly-Pear was present just outside the margin of the east site.

At least four species of terrestrial mammals have been extirpated from the coastal slope of San Diego County during the last 150 years: Grizzly Bear, Kit Fox (a now-extinct subspecies), Jaguar, and Pronghorn (=American Antelope). Amazingly, it is reported that a Pronghorn taken in coastal San Diego County was the first mammal ever collected in California for science (fide Bond 1977). See the subsection below on predators for discussion of top level predators on the study area.

Predators

No indication of the presence of Mountain Lion was recorded. Based on landscape context and study area resources and configuration, it is probably absent, though it may be a rare visitor (Beier 1993, 1995). Coyotes were conspicuous on both sites, with at least one active den on each. Bobcats are also present on both sites, although sign was more local, restricted to near the central-west edge of the west site and the central-east edge of the east site. Common Gray Fox (=Gray Fox) sign was noted at one restricted local in a dense shrub area extending off of the west edge of the west site. At a local scale, foxes generally avoid areas heavily used by Coyotes (pers. obs.; K. R. Crooks, pers. comm., 2000; Sovada et al. 1995).

One important potential effect of habitat alteration by man is often referred to as, "mesopredator release". In this situation, the removal of top predators (e.g., Coyote) can "release" an important constraint on populations of smaller predators (e.g., gray fox, skunks, and opossum), which in turn adversely affect populations of many native species such as birds and rodents. Particularly relevant papers addressing this issue include Soulé et al. (1988), Rogers and Caro (1998), Courchamp et al. (1999), and Crooks and Soulé (1999), and there is extensive anecdotal evidence. At this point there remains little doubt that the phenomenon contributes to the effects of human disturbance to some degree in many areas of southern California.

Coyotes, which remain important on the study area, are usually referred to by biologists in this context as a top predator. However, it should be kept in mind that only 100 to 200 years ago, Jaguar and Grizzly Bear were probably present at the study area vicinity. There seems to be some disagreement in the literature as to whether the main abundance of grizzlies was in montane or lowland "chaparral" areas (e.g., Bond 1977, Jameson and Peeters 1988), but they clearly were not rare in lowland southern California generally. Importantly, the ecological repercussions of such alterations may still be cascading through our natural communities; some of the larger oaks along Los Coches Creek south of the east site may have coexisted with these truly “top predators”.

Native mesopredators on the study area that may benefit from mesopredator release include Common Gray Fox and Bobcat. No indication of Common Raccoon (=Raccoon) was found on the study area, but it may be present along portions of Los Coches Creek. The species does not appear to be as attracted to human habitation in San Diego as elsewhere (e.g., northern California and many areas in the eastern U.S.), though it remains an opportunist; see comments in Bond (1977). No indication of the presence of Long-tailed Weasel was found, although the study area appears to provide suitable habitat.

Special Status Mammals
As discussed above, it appears that San Diego Desert Woodrat has been extirpated from the west site, and likely occurred in the past on the east site as well. One active midden was found between the two sites, just outside the east site in cactus on open space not currently preserved. The cause(s) of extirpation are not entirely clear, although habitat fragmentation and predation rates may contribute.

No other special status mammals were detected on the study area. Townsend's Big-eared Bat and Pallid Bat have low but reasonable potential to forage on the study area occasionally, and the latter species may also roost. Little Pocket Mouse and San Diego Pocket Mouse both have an intermediate potential to occur fairly commonly. Similarly, Southern Grasshopper Mouse has an intermediate potential to occur in low numbers. For all of these species, the local subspecies has special status. The local subspecies of Mule Deer is an MSCP covered species. It was not detected and is not expected to occur; see Section 3.8.4 for more on this issue.

Nonnative Mammals
The following nonnative mammals were noted:
Virginia Opossum -- noted mostly at the periphery of the east site; known to frequently predate bird nests and an important species that may benefit from factors promoting mesopredator release.
Black Rat -- one dead individual was noted in a fuel modification zone on the east site.
Domestic Dog -- very common on trails, mostly on leashes with owners, but sign present throughout the study area (perhaps more widespread at night); see Section 3.7 for discussion of potential impacts of this species on study area resources.
Domestic Horse -- uncommon on both sites, almost entirely along major trails.
Domestic Cat -- Suspected to be an important predator on the study area, along with Coyote. A total of 9 partial or complete cat carcasses were noted during the current work on the study area (some probably predated by Coyotes). In addition, one dying cat was found -- a young male apparently hit by a car -- and at least a half dozen individual foraging cats were noted (not associated with the periphery) during the work despite the fact that they are primarily nocturnal hunters and the field work was nearly restricted to daylight. No evidence was seen of a feral population of Domestic Cats on or near the study area. Instead, all of the cats appeared to be domestic pets from adjacent residential areas; two of the carcasses had collars (none had identification).

The only nonnative mammal that was not recorded but is expected to occur is House Mouse. At this time, the feral Red Fox population along the coast does not extend this far inland, although occasional escaped or dispersing individuals may occur.

3.7 Human Context and Use

The landscape context of the study area with regard to human presence and changes is discussed below. The discussion is broken into three sections: human history, current context, and study area uses.

3.7.1 Human History
Historic aerial photos were made available for review by the County's Department of Planning and Land Use. Several showing the study area were reviewed, including images dated 1928, 1953, 1970, and 1973.

The 1928 photo reviewed for this work appears to show some dairy and or grazing use of the study area, with almost no urbanization in the vicinity. An apparently unpaved Los Coches Road ran in a similar configuration to where it does today, between the two sites, and Los Coches Creek also had a similar drainage path to that today.

The creek was apparently unconstrained at that time, and followed an apparently natural, slightly irregular path. It was notably wider than the existing channel, which has a rather deep, earthen bed and bank south of the east

site and for several hundred feet after passing under Los Coches Road. The old photo appears to show an open, sandy wash with scattered large trees, scattered patches of shrubs (probably willows and/or Mule Fat), and a narrow, active but meandering channel within the wash. This openness could have been the result of recent scouring, cattle grazing, or a more episodic flow than is currently present. It appears likely that a substantial portion of the current flow is provided through sources with both increased quantity and decreased seasonality (i.e., increased urban flows and decreased watershed erosion from removal of extensive grazing over the decades).

Historically, the slopes at the study area appeared to show a similar to somewhat greater and less fragmented extent of shrub lands, and seems more likely by appearance to have been sage scrub than chaparral. Rock outcrops were similar to today. On the whole, the 1928 photo appears to show the study area and its surroundings in a decidedly more pastoral context, but not clearly receiving less impact than today, and also as expected, with no evidence that in 1928 the study area was in a pristine natural state which could be defined as a baseline condition prior to man.

By 1953, substantially more development had occurred in surrounding lowlands, including numerous structures and groves or row crops in the central valley between the two parts of the study area. Some bare areas on hills within and adjacent to the current study area may indicate either recent fire or ongoing cattle grazing. Strongly visible here is the current pattern of oaks in the drainage, primarily at or east of Los Coches Road, but the creek now appears beyond this point to be at least weakly constrained, perhaps in an earthen channel. There appears to be little or no natural vegetation present between the two sites (somewhat speculatively, grassland appears to be present where active human use is absent). The shrub lands of the two sites appeared to be more sparse than currently, though this was difficult to accurately interpret on this photo.

By 1970 some of the present surface contour alterations on the east site can be seen, and the surrounding area is clearly urbanizing with many new residential tracts in place or underway to the east, south, and west. By only 3 years later, the study area and vicinity have begun to rather closely approach the current configuration of fragmentation and partial isolation. However, at that date both sites retained a connection with Los Coches Creek through open space (disturbed at the east site, scrub at the west site), especially toward the south end of the study area where the creek appears to support riparian habitat (probably Mule Fat). It appears that the area where a covered reservoir is now present at the west edge of the west site was at that time an area of sage scrub continuous with the site. Deer or other animals may have made nighttime passages across the landscape at this stage with occasional difficulty at bottlenecked portions along the route(s).

3.7.2 Current Human Context

Currently the area is in the growing, unincorporated community of Lakeside, which has a population of just under 40,000 (based on community limit signs with no date). This appears to be an older community with a semi-rural history that is converting to a residential exurb of the City of San Diego. However, no examination of zoning or land use planning documents was made.

Land uses surrounding the two sites are almost exclusively for single-family residential units at this time. It is understood that the area to the north of the east site is to be retained in open space by the County. See Section 3.8.4 for more information on immediately adjacent lands.

3.7.3 Study Area Human Uses

All evidence suggests or supports that both sites have been continuously composed of natural communities. Based on evidence in the aerial photos, it appears that the central lowland between the two sites was used for agricultural purposes for some time prior to more intensive current uses. In general, commercial dairies for some time have kept cattle either in pasture grasslands or small areas with food provided on site. Thus, this use may not have subjected the study area to heavy grazing. It appears that the borrow site abutting the south end of the east site

has been maintained as such since prior to 1958, as that area shows a similar but less extensive removal of materials in the County's aerial photograph of that date.

Three areas appear to show signs of past grading, presumably for commercial and/or residential development. A relatively flat area riddled with trails is present on the west site north and northeast of the adjacent covered reservoir, and may have been graded several decades ago, or may have been a naturally flat area that has more recently been heavily disturbed with trails. A second apparently artificially flattened area is at the highest portion of the west site, above the slope forming the south end of that site, and is similarly riddled with trails and overlooks a series of cut terraces extending to the north. These latter terraces are re-vegetating, but still have substantial amounts of Broom Baccharis. Finally, an obviously graded set of terraces is present toward the southern end of the east site. Most of this latter area is riddled with trails and some parts are re-vegetating with a mix of Broom Baccharis and other sage scrub species. None of the three potentially graded areas appears as disturbed in the 1958 aerial photograph, but all appear at least somewhat disturbed by 1970.

Some trails on the study area appear to be well-established, including placement of materials to minimize erosion. However, no evidence was seen that any but the most central trails receive substantial use at this time. During the current work several instances of use by motorcycles and two instances of use by bicyclists were noted, and considerable evidence is present of a greater amount of use in the recent past. Also using the main trails (primarily to almost exclusively) were modest numbers of hikers, joggers, schoolchildren, and dog walkers.

Apart from trails and past grading, only limited study area modifications are apparent at this time. At several points on the west site, trails or other openings have had contours modified, apparently to enhance the riding enjoyment for off highway vehicles and/or bicycles. Permanent signs present at several locations state that the sites are County open space and that motorized vehicles and hunting are prohibited. These signs appear to have been installed not too long before the current field work began.

On the west site, no sign was noted of any human encampment or other use of the site or adjacent areas (including adjacent portions of Los Coches Creek) as open living space currently or in the past. On the east site, evidence was seen of what had in the recent past been either a small encampment or a play fort for children toward the top of one drainage. No sign was seen of any drug use or manufacture (e.g., no hypodermic needles, dumped pseudoephedrine containers, marijuana plants, or old, plastic irrigation lines). Shooting appears to be relatively rare (bullet and shotgun shell casings and paintballs were occasional to rare), as is typical for smaller sites largely surrounding by residential use.

Fuel modification zones are conspicuous as Disturbed Habitat along most boundaries abutting residential areas, but not elsewhere at this time (see Figures 3.4-1 and 3.4-2). These zones are mowed or otherwise cleared of significant vegetation into the open space land, with no fire suppression measures noted on the residential properties themselves. In many cases untreated wooden fencing is used to mark such boundaries. These zones have typical widths of about 12 m (about 40 feet), and thus total roughly 2.75 h on the two sites combined; about 75% of this is on the east site, which holds most of the study area boundary shared with residential areas. Along the interior boundary of some fuel modification zones there is active dumping of yard waste, trash, and/or natural vegetation from fuel zone clearance on top of remaining sage scrub vegetation. Thus the estimated area of direct disturbance from this issue on the study area is currently an estimated 3.4 h (about 8.4 acres), or about 7 to 8% of the total study area. See Section 3.8.4, under "Impact Buffering" for further discussion.

Study area public access points at this time for the two sites are as follows. On the west site at: (1) the northwest corner (road end), (2) Los Coches Creek channel approximately 75 m south of the northeast corner (constructed bridge across the channel), (3) the west end of Calle Lucia Terrace at the south end, (4) along the south end of Sherann Drive at the southwest edge, and (5) along an unnamed street at the southwest corner of the adjacent, covered reservoir. On the east site at: (1) a dirt road with a gate at the north end, (2) the south end of Petite Lane, (3) the south end of Rancho Mirage Lane, (4) the small open space connection at the northeast corner, (5)

along Manajo Road and Lake Madera Court, (6) along Ha Hana Road (by walking through the old borrow pit), (7) along Los Coches Road at the southwest corner, (8) at the east end of Rodeo Drive, (9) possibly at Spencer Court (east end of Shayann Lane), and (10) the east end of Rim Road.

As presented in Section 4.1, it may benefit study area resources, reduce costs of study area management, and decrease risks to adjacent residences to reduce public access points to no more than about 8 or 9 well-marked points. Any current access points that are closed should be announced (1) ahead of time with media information, signs at those locations and information on access points to be kept, and (2) after closure, with signs at closed locations having clear maps to the remaining access points.

3.7.4 General Adverse Effects

The presence of humans and associated species and materials on and immediately adjacent to natural communities potentially brings with it a broad array of direct, indirect, and cumulative effects, or impacts, to the natural resources. Anthropogenic effects at the scale of individual land reserves are highly interactive, such that one may cancel, magnify or dilute another dramatically. In part because of the complex interactions, such effects are often poorly understood and unpredictable in specific results. Finally, to the degree that an impact alters the "playing field" of existing natural selection at community and landscape levels, there is a very strong tendency for it to promote generalists. Thus, impacts with opposite immediate results may have the same or similar ultimate results.

One example of important potential interactive effects is that among fuel modification zones, nonnative plants, and fire. It is well-accepted that fuel modification zones increase invasion of adjacent open space by nonnative plants, and this result in turn may make such areas more susceptible and more vulnerable to large, hot fires. Thus, fuel modification zones may promote fires, at least within the natural areas and in the long term. Extant research suggests this scenario as quite reasonable or even likely (O'Leary and Westman 1988, D'Antonio and Vitousek 1992, as cited in Minnich and Dezzani 1998).

3.7.5 Specific Adverse Effects

- Trash dumped on the study area was generally fairly light except locally at edges and fuel modification zones, where dumping of yard waste (plant trimmings, etc.) is frequently heavy. The most widespread trash on both sites is golf balls and balloons.
- Impacts observed to soil conditions at the study area, especially at trails, include erosion / deposition, soil compaction, surface sealing, and biological soil crust death. See Belnap et al (2001) for short discussions on most of these issues in relation to biological soil crusts. A probable but not confirmed impact is nitrogen deposition. However, this appears to be a complex issue as preexisting conditions and alterations to soil chemistry, vegetation, fire regime, and soil crusts all are potentially important. There is some evidence that soils in the region are still receiving increased soil nitrogen availability (which favors most ruderal plants over natives) from air pollutant deposition, despite major declines in this process in recent years. For further information on this issue, see Fajer (1989), Minnich and Dezzani (1998), Belnap et al. (2001), and both Allen et al. (1996) and (Padgett et al. in press), as cited in Minnich and Dezzani (1998).
- Direct effects observed from study area use by the public during the current work included increased risk of fire (e.g., sign of fireworks shortly after 04 July, occasional cigarette butts), the possibility of making the study area less attractive as a wildlife movement corridor due to deposition of human and pet scents, enhancing the study area for Brown-headed Cowbirds (which feed from horse and other manure), and assisting invasion by nonnative plants and animals, especially through dumping of yard waste. Some knowledgeable restoration biologists suspect that invasion by nonnative annuals is greatly promoted by seed-carrying in the coats of Domestic Dogs where dog walking is common (e.g., pers. comm., B. Wilson, Las Pilitas Native Nursery, 2001), and this activity is locally common at the study area. Unleashed dogs were also seen on about half of the study area visits.

- Indirect impact of noise from adjacent areas. Such noise is generally moderate but omnipresent. Noise sampling was conducted only occasionally, using with an Extech 40773 analog sound level meter (A-weighted). The primary noise sources at this time are vehicles traveling Los Coches Road, airplanes overhead, and miscellaneous noise in neighborhoods, especially 2-stroke engines (e.g., motorcycles being ridden and worked on). Typical background noise appears to range from the upper 30's to low 40's in decibels, but rather frequently spikes into the upper 40's to mid-50's (e.g., trash trucks, honking horns). The loudest noises sampled were: (1) motorcycles on the west site, measured from the east site at about 60 decibels (obviously attenuated by the distance) and jack hammers working in a backyard roughly 100 m away which registered at 55 to 58 decibels on the study area.
- Indirect impact of light from adjacent areas. Night lighting appears to be moderate at this time, in keeping with the primary adjacent land use of residences. Street Lighting along Los Coches Road, vehicles on Los Coches and other streets, lighting from the commercial areas to the north of the study area, and nighttime lighting at backyards and windows shed significant light on virtually all of the two sites (the darkest area is probably the south end of the west site), but this was not quantified.

3.8 Special Resources and Functions

3.8.1 Coastal California Gnatcatcher

Due to the need to address a broad array of issues under limited resources, background information on California Gnatcatcher ecology and conservation status is not generally provided here. As discussed in the methods section of this report, a great deal of information on this species has been developed and published in the last decade; see the various resources listed in Appendix I, especially Atwood and Bontrager (2001) for a recent and very thorough overview.

See Figure 3.8-1 and Figure 3.8-2 for graphical results of California Gnatcatcher (hereafter, "CaGn") observations on the study area. Based on the observed CaGn use areas at and adjacent to the study area, it appears that at least some portions of 6 to 8 home ranges are present within the current study area boundaries: 3 on the west site and 3 to 5 on the east site. Of this total, 0 to 3 home ranges are judged to be entirely within the study area. The remaining home ranges detected in the study area and vicinity (57 to 100% of the total) were partly on and partly off of the study area. No home ranges were detected that were entirely off the study area, although all contiguous areas were not surveyed. Additional observations were made in adjacent areas but are not shown or reported on here due to constraints of publishing information regarding listed species on private property for which access permission was not granted. Unfortunately, those data are relevant to conclusions drawn here regarding the numbers of CaGn present on the study area, as it clarifies findings regarding home ranges.

While productivity could not be quantitatively analyzed using the current methods, it appears that it was low to moderate on the study area and adjacent lands during the current season. One brood of 5 recent fledglings was noted on the east site. This is an uncommonly large number, but not inordinate, and the study period weather in the region may have resulted in relatively many large broods where fledging success was achieved (pers. comm., R. A. Erickson, LSA Associates, 2001; pers. comm., W. E. Haas, Varanus Biological Services, 2001). This idea is supported by the timing of the observation of the large group of fledglings in late May, after substantial April rains (see Patten and Rotenberry 1999). Unlike in some other species (e.g., California Quail, Bushtit), separate groups of fledglings rarely or never aggregate early after fledging (pers. obs.), so this is not likely to have reflected multiple broods.

Fledglings were noted from the use areas of at least 3 pairs, and no fledged juveniles were noted in the observed use areas of at least 3 other pairs on the study area during the entire season. The largest area of sage scrub lacking CaGn sightings during the current work is the northern half of the west site. This may not reflect any important factor about that portion of the study area (no obvious potential cause was noted); history and context

Figure 3.8-1
Study Area California Gnatcatcher Data: West Site
MSCP Lakeside Archipelago Lands
San Diego County, California

Boundary of Study Area

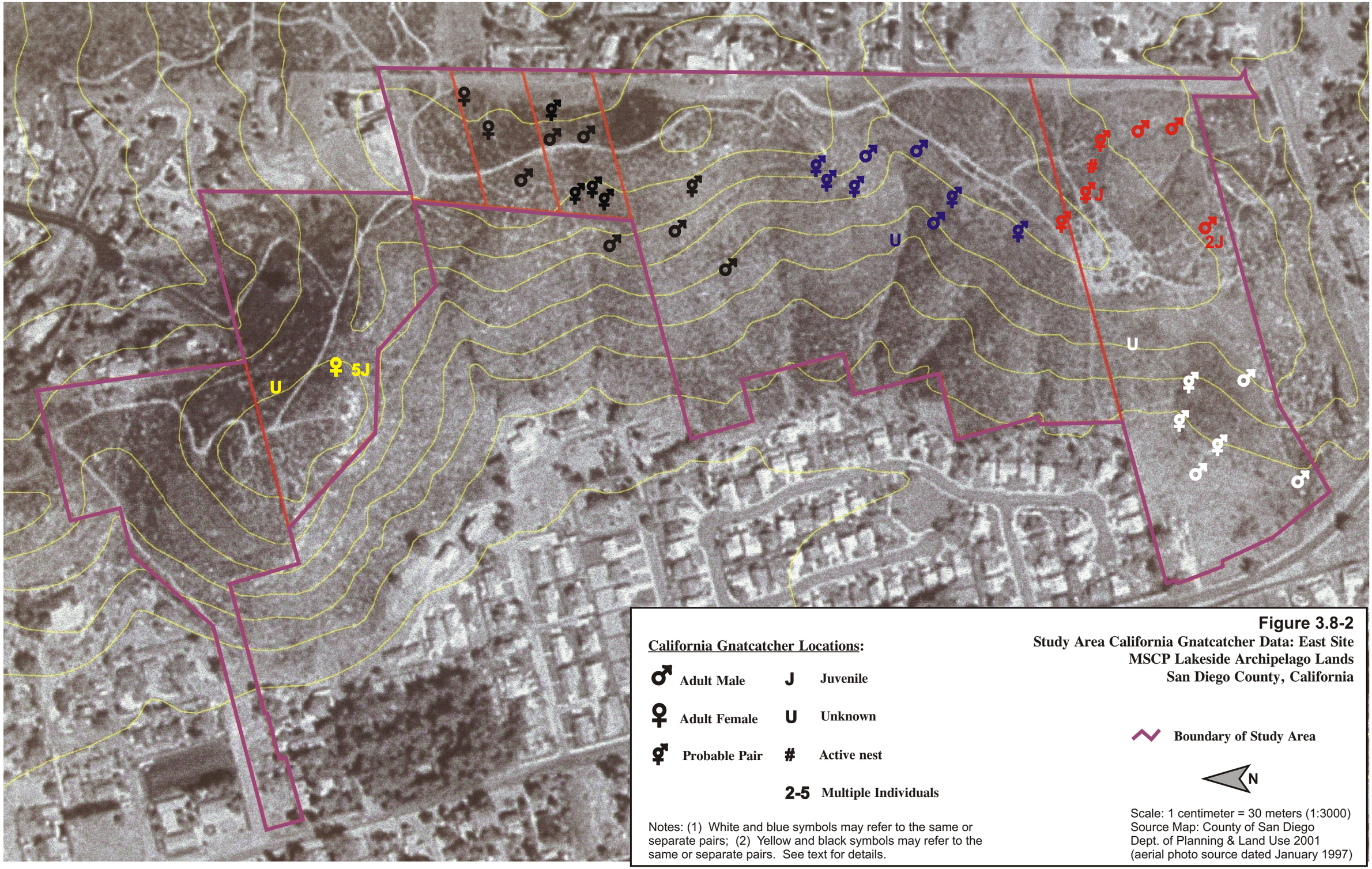
California Gnatcatcher Locations:

♂	Adult Male	J	Juvenile
♀	Adult Female	U	Unknown
♂♀	Probable Pair	#	Active nest
		2-5	Multiple Individuals

Note: Yellow symbols may represent an unmated male or a pair. See text for details.

N

Scale: 1 centimeter = 30 meters (1:3000)
Source Map: County of San Diego
Dept. of Planning and Land Use 2001
(aerial photo source dated January 1997)



California Gnatcatcher Locations:

♂	Adult Male	J	Juvenile
♀	Adult Female	U	Unknown
⚥	Probable Pair	#	Active nest
		2-5	Multiple Individuals

Notes: (1) White and blue symbols may refer to the same or separate pairs; (2) Yellow and black symbols may refer to the same or separate pairs. See text for details.

Figure 3.8-2
Study Area California Gnatcatcher Data: East Site
MSCP Lakeside Archipelago Lands
San Diego County, California

Boundary of Study Area

N

Scale: 1 centimeter = 30 meters (1:3000)
Source Map: County of San Diego
Dept. of Planning & Land Use 2001
(aerial photo source dated January 1997)

may be as important as content. For example, the study area population could simply be below carrying capacity for stochastic reasons or due to lowered fitness of individuals as a result of isolation. No predation of CaGn nests, young, or adults was detected during the current work.

It is widely assumed by most biologists working with this species that there is a metapopulation structure to the birds within California. This is not proven, but is a reasonable starting assumption, at least in the short term, in working with the species on a regional scale. Briefly, a metapopulation is a spatial array of populations in which each population is independent in demographic features, but yet there is some minimal level of genetic flow between populations. Such a spatial structure is believed to greatly enhance long-term viability of species, as setbacks (e.g., disease, disaster, or genetic problems) will tend to occur below the level at which extinction would occur, and also enhances the opportunity for species to genetically adapt to local conditions while avoiding some of the risks of overspecialization. Two very good sources for discussion of these issues are Rhodes et al. (1996) and Hanski and Gilpin (1997).

Based on current research, CaGn is probably a poor species to use to gauge the integrity of sage scrub community at either local or regional scales, let alone that of the array of resources and functions to be covered under the MSCP. As noted in Chase et al. (2000), "efforts to conserve bird and small mammal biodiversity in coastal sage scrub . . . should focus on a diverse suite of species that are representative of the range of variation in communities found in coastal sage scrub habitats."

Criteria for useful indicator species, given in Hilty and Merenlender (2000), seem to support this negative conclusion for CaGn. It seems even less suited as a keystone species ("keystone species have large effects on community structure or ecosystem function" – Kotliar 2000). Gnatcatchers have also been promoted as a useful "umbrella" species, but the utility of such species seems to be primarily in choices about preservation, not in management guidance after the land is in preserves. Even then, existing evidence appears not to support the concept, at least for this species (Rubinoff 2001).

The data obtained during the current work appears to support these concerns about use of CaGn to drive either protection or management with regard to the study area. It was not clear what the limitations are to CaGn on the study area, nor is it clear how more specific CaGn survey data (e.g., "exact" numbers and delineation of home ranges) would drive focused management measures that would have broadly beneficial results for the study area community.

Potential limiters to CaGn and other bird species' populations on the study area include (1) high nest failure rates (e.g., as a result of mesopredator release or simply too many house cats), (2) various adverse effects of habitat disturbed through fire suppression and invasion by nonnative plants, (3) reduced fitness due to genetic isolation over time, and/or (4) reduced survivorship due to reduced opportunity for dispersal and recruitment, resulting from isolation of the sites from the previously adjacent riparian corridor of Los Coches Creek (see Campbell et al. 1998). Other problems are potentially present (e.g., lowered fitness due to inbreeding), but are not addressed by the current work.

In contrast, it is judged to be likely that the resident bird species, including California Gnatcatcher, are still able to effectively disperse across the developed area between the two sites, and between open spaces in the larger "archipelago" of lands between Lake Jennings to the northeast and past Interstate Highway 8 at the south. California Gnatcatchers probably negotiate these gaps rather rarely due to modest population sizes, but without especially great difficulty or risk. But, evidence to date suggests that this species can and does penetrate substantial distances across "inhospitable" areas, especially where apparently suitable habitat is visible (Bailey and Mock 1998, Atwood and Bontrager 2001).

Further, general evidence regarding natal (i.e., fledgling) dispersal indicates that it should not be seen as a random radiation, but as a focused search by individuals using implicit criteria. Availability of movement

corridors, suitability of encountered habitat, detected adjacent occupancy by conspecifics, and other factors probably determine movement direction, movement rate, and settling choices (Smith and Peacock 1990). Thus, on the basis of the study area data and current configuration and current knowledge regarding California Gnatcatcher dispersal biology and population structure, it appears reasonable to assume that at this point the study area is part of a functioning dispersal corridor for this species. However, any appreciable further loss of integrity on the study area and immediate surroundings may make this an unsound assumption.

Future monitoring of California Gnatcatchers should be designed to generate data that will support investigations into potential problems with productivity and survivorship rather than emphasizing spatial use. It is also critical to minimize potential impacts of the monitoring itself on gnatcatchers and other sensitive resources, given the small size of the study area and tenuous status of the species here. Thus, as provided in Section 4, we recommend that qualified biologists conduct low-impact spot mapping and associated observations during the breeding season, approximately 1 out of every 4 to 5 years. If funding allows and future work on the study area supports current concerns regarding predation levels, a study focusing on productivity and survivorship of California Gnatcatchers at the study area may be appropriate.

Spot mapping for the study area should be assumed to require 48 biologist-hours, given that a highly qualified individual is conducting the work. If someone with modest but adequate experience is used, the number of hours needed should be at least doubled, along with at least a corresponding increase in the potential for adverse impacts. If this work is performed every 4 years, and the cost over that time is $80 per hour (assuming typical future rates), field work costs for a highly qualified individual should average about $960 per year, with total costs (including direct costs such as mileage and office costs such as data analysis, report preparation and meetings) roughly twice that, or about $1900 per year. If the same work is performed by a biologist with modest but adequate experience, at a rate of $50/hour (again, assuming future rates), the total cost would be about $2400 per year, with perhaps two to three times the level of potential observer impacts as for the highly qualified individual.

We strongly recommend avoiding use of any presence/absence methodology for California Gnatcatcher monitoring work on the study area, for example that detailed in USFWS (1997). This method is relatively intrusive compared with spot mapping because it is narrowly designed to provide relative certainty about presence at a site as a basis to determine potential for project-related take under the Endangered Species Act. This method becomes intrusive and inefficient when used to document either accurate numbers or use areas once presence has been determined.

3.8.2 Other Special Status Species

Eleven species with special status, other than California Gnatcatcher, were detected on the study area during the current work. All are terrestrial vertebrates and are listed in Table 3.8-1, below, including the geographically appropriate special status taxa. See Section 3.2.5, under the appropriate subheadings, for more details on these species. See Section 3.8.1, above, for information on Coastal California Gnatcatcher. See Figure 3.8.3 and Figure 3.8.4 for distribution data on all recorded special status species other than California Gnatcatcher.

Table 3.8-1. Species With Special Status Recorded on the Study Area

Species: English Name (Scientific Name)	**Species Status[1]**
San Diego Coast Horned Lizard (*Phrynosoma coronatum blainvillei*)	SSC, M
Coronado Western Skink (*Eumeces skiltonianus interparietalis*)	SSC
Belding's Orange-throated Whiptail (*Cnemidophorus hyperythrus beldingi*)	SSC, CFP, M
White-tailed Kite (*Elanus leucurus*)	CFP
Sharp-shinned Hawk (*Accipiter striatus*)	SSC

Figure 3.8-3
Study Area Other Special Status Species Data: West Site
MSCP Lakeside Archipelago Lands
San Diego County, California

Boundary of Study Area

Individual Observations of:

CH	Cooper's Hawk
WTK	White-tailed Kite
YW	Yellow Warbler
DWR	Desert Woodrat

Bird Activity:

(F)	Foraging in Flight
(P)	Perched

Approximate Occupied Areas:

Rufous-crowned Sparrow

Orange-throated Whiptail

Note: Additional records of special status species not shown refer to (1) birds moving high overhead but not interacting with the site (Double-crested Cormorant, White-faced Ibis, Osprey), and (2) species noted adjacent to the study area (Coast Horned Lizard, Orange-throated Whiptail, White-tailed Kite, Sharp-shinned Hawk, Cooper's Hawk, Cactus Wren, Western Bluebird, & Rufous-crowned Sparrow).

N

Scale: 1 centimeter = 30 meters (1:3000)
Source Map: County of San Diego
Dept. Of Planning & Land Use 2001
(aerial photo source dated January 1997)

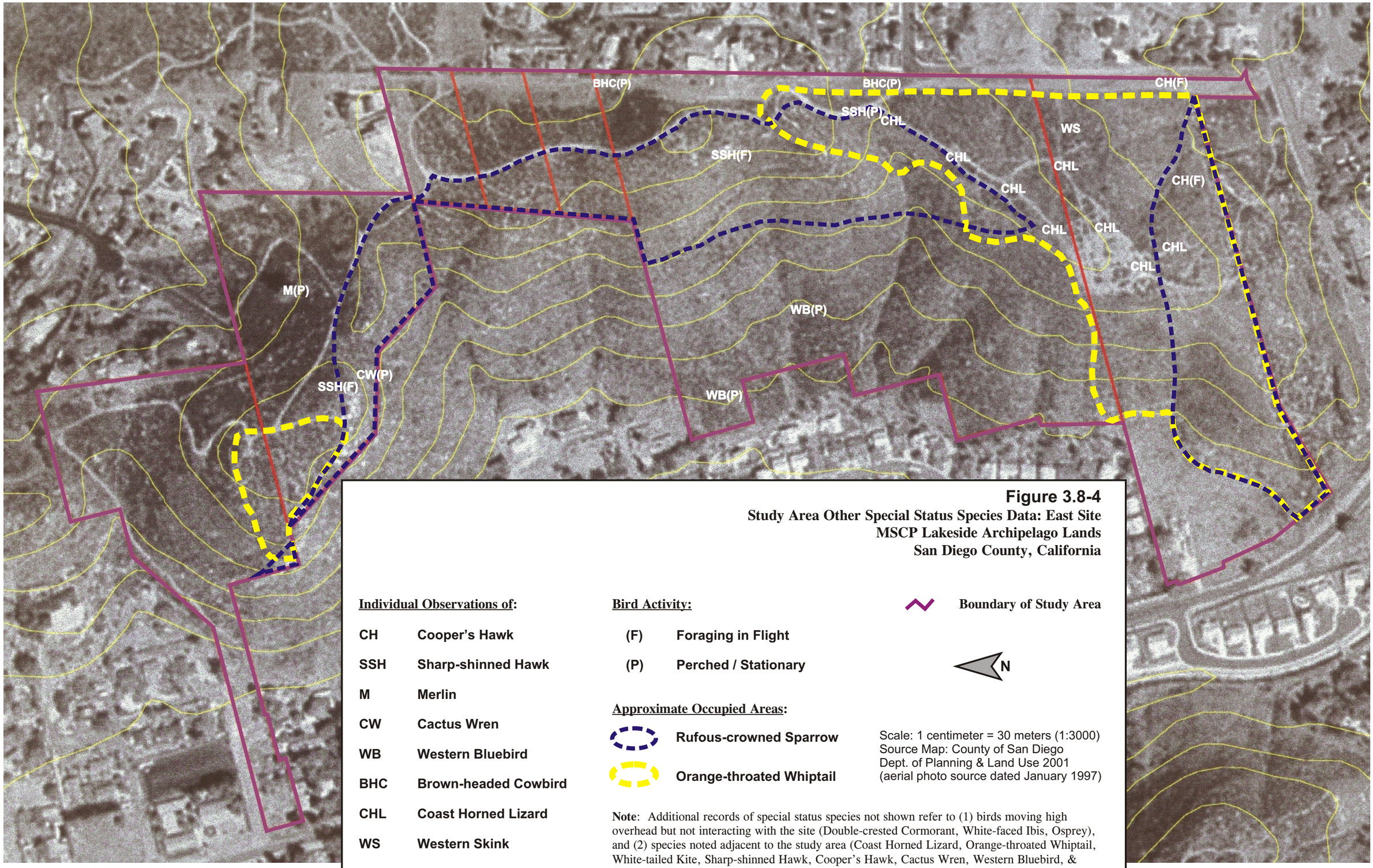


Figure 3.8-4
Study Area Other Special Status Species Data: East Site
MSCP Lakeside Archipelago Lands
San Diego County, California

Individual Observations of:

CH	Cooper's Hawk
SSH	Sharp-shinned Hawk
M	Merlin
CW	Cactus Wren
WB	Western Bluebird
BHC	Brown-headed Cowbird
CHL	Coast Horned Lizard
WS	Western Skink

Bird Activity:

(F)	Foraging in Flight
(P)	Perched / Stationary

Approximate Occupied Areas:

- Rufous-crowned Sparrow
- Orange-throated Whiptail

Boundary of Study Area

N

Scale: 1 centimeter = 30 meters (1:3000)
Source Map: County of San Diego
Dept. of Planning & Land Use 2001
(aerial photo source dated January 1997)

Note: Additional records of special status species not shown refer to (1) birds moving high overhead but not interacting with the site (Double-crested Cormorant, White-faced Ibis, Osprey), and (2) species noted adjacent to the study area (Coast Horned Lizard, Orange-throated Whiptail, White-tailed Kite, Sharp-shinned Hawk, Cooper's Hawk, Cactus Wren, Western Bluebird, & Rufous-crowned Sparrow).

Cooper's Hawk (*Accipiter cooperii*)	SSC, M
Merlin (*Falco columbarius*)	SSC
Coastal Cactus Wren (*Campylorhynchus brunneicapillus couesi*)	SSC, M
Coastal California Gnatcatcher (*Polioptila californica californica*)	FT, SSC
Western Bluebird (*Sialia mexicana*)	M
Western Yellow Warbler (*Dendroica petechia brewsteri*)	SSC
Ashy [=Southern California] Rufous-crowned Sparrow (*Aimophila rufescens canescens*)	SSC, M
[1] - See Table G1 in Appendix G for explanations of abbreviations.	

See Appendix Table E2 for further information on special status plants. Information on each of the species in Table 3.8-1 as well as certain other noteworthy species (e.g., Brown-headed Cowbird) is provided in subsections 3.6.3 through 3.6.5.

3.8.3 Critical Habitats

The study area does not appear to be within proposed or designated critical habitat for any federally listed endangered or threatened species. As addressed in the MSCP Implementation Agreement (County of San Diego 1998, Section 9.17), such status for the lands under the current study would not alter MSCP proscriptions or responsibilities. The state of California does not have a regulatory equivalent for critical habitat.

3.8.4 Site and Area Connectivity

The term "site connectivity" is used here as an inclusive heading for brief summaries of observations for the study area on impact buffering, fragmentation and topology (e.g., "holes" and edge effects), and the connection of the study area with the landscape through wildlife movement corridors and landscape linkages. A thorough review of fragmentation issues, defining this term broadly, is Saunders et al. (1991), while Lord and Norton (1990) provide a useful examination of the issue in light of scale and granularity. Another useful resource both in briefly reviewing these issues and making recommendations to address them in an urbanizing landscape such as that of the current study area is Marzluff and Ewing (2001).

Impact Buffering

Kelly and Rotenberry (1993) provide a useful summary of how both indirect and direct impacts from adjacent development may reduce the effective size of a reserve in southern California as well as how the presence of buffer areas may minimize or offset such effects. Site to site variation in sensitivity results from many factors, including variation in the sensitivity of reserve components (species and functions) and interactions among arrays of effects, resources, and study area characteristics (e.g., elevation, climate, acoustics, and landscape context).

Such real world phenomena as changes in codes, covenants, and restrictions ("CC&Rs") of adjacent developments can have substantial effects on reserves. For example, under California state law effective 01 January 2000, it is illegal to restrict both new and existing property owners from owning "indoor pets" such as cats, and no one tracks the extent to which such animals are actually kept indoors.

At the study area for the current work, open space buffering of potential impacts varies along the perimeter of both sites from none to apparently well over 100 m. Most open space adjacent to the sites is sage scrub, but is not currently preserved from development. The ownership boundary of the current study area results in a high edge-to-area ratio, but that ratio is substantially lowered if one includes the adjacent open spaces. Thus, the integrity of both sites almost certainly remains quite vulnerable to future development. It is likely that if most or all open space land adjacent to the sites were to be developed (e.g., to residential neighborhoods), the natural biological resources and functions of the existing study area would rather closely approach zero within a decade.

An example using fuel modification zones, as addressed in Section 3.7.3, may clarify this issue. If all edge areas in the study area (using the current ownership boundary) were converted to fuel modification zones at a width of 15.24 m (50 feet), and if (to simplify for the sake of evaluation) associated impacts degraded overall study area resources by an amount equivalent to complete loss of an equal additional area (i.e., d=15.24 m and 100% loss following Laurance and Yensen 1991), then the potential reduction of natural resource values on the study area due to fuel modification zones alone would total 30 to 35%, or about 5 times that for the current area of fuel modification zones. Another example is predation by non-feral Domestic Cats; a sufficiently large reserve will have reduced effects in the interior as the mean foraging distance of non-feral cats is reached and exceeded.

Larger study areas and study areas which have a lower edge-to-area ratio (i.e., closer to a circle in shape) thus will suffer less from this type of impact. Viewing this issue alternatively, reserves or portions of reserves with a width of less than about 60 m (200 feet) regardless of length have the potential in the future to be composed exclusively of fuel modification zones and a saturation of associated adverse effects.

Fragmentation and Topology

As stated above, the current ownership boundary of the study area is substantially "poorer" from the perspective of reserve design, than is the current, larger, open space boundary. Bogaert et al. (2000) provides an informative approach to quantifying fragmentation as a basis for study area evaluation and comparisons, but this work does not include the issue of variations in spatial patterns among different effects, different species and different communities. Following from this, the proposed single measure in Bogaert et al. (2000) for quantifying fragmentation could mask important variations among study areas due to biological differences and thus provide much less information than is needed.

The study area natural communities have a number of "holes" where interior portions are predominantly or exclusively "Disturbed Habitat" (see Figures 3.4-1 and 3.4-2). The cause is not obvious, but could include past grazing and/or fire from more than 73 years ago (i.e., the earliest aerial photograph available).

Wildlife Movement Corridors and Landscape Linkages

A distinction is often made between wildlife movement corridors and landscape linkages. Landscape linkages (sometimes called habitat linkages) are areas which provide a passive communication between two or more natural areas which are often larger or superior in specific qualities to the linkage. Such linkages can be quite small or constricted, but may be critical to the long-term health of connecting habitats. The key character of successful linkages is that they support: (1) successful gene flow between distinct populations of a wide variety of organisms, especially plants and invertebrates, and (2) gradual redistribution of populations, for instance as communities on both sides pass through seral stages. Gene flow across a successful linkage may require many generations, or might occur only during rare events such as floods.

Wildlife movement corridors are similar in some ways to landscape linkages, but provide important opportunities or pathways for individual animals, typically amphibians, reptiles, mammals, and weakly flying invertebrates and birds, to disperse or migrate between open areas. The open areas in such cases are generally extensive but, except for such corridors, largely or wholly separated from each other. It is important to keep in mind that criteria for successful corridor function should include an estimated rate of passage (conceptually, "impedance," or measure of the ease of passage, in conjunction with source populations and their distances) for specified target species or, at most, groups of similar species. Adequate cover, limiting configurations (length, width, etc.), and tolerably low levels of disturbance are common requirements for wildlife movement corridors, but individual species can vary greatly and specific requirements are often poorly known, or at least poorly documented. Habitat in wildlife movement corridors may be quite different than that in the connected areas, but if used by the wildlife species of interest, they may still function as desired. A wildlife movement corridor could for example, be a riparian corridor frequently used by individuals of a shrub lands species undergoing a natal dispersal, even when the habitat surrounding the corridor is potentially suitable shrub lands.

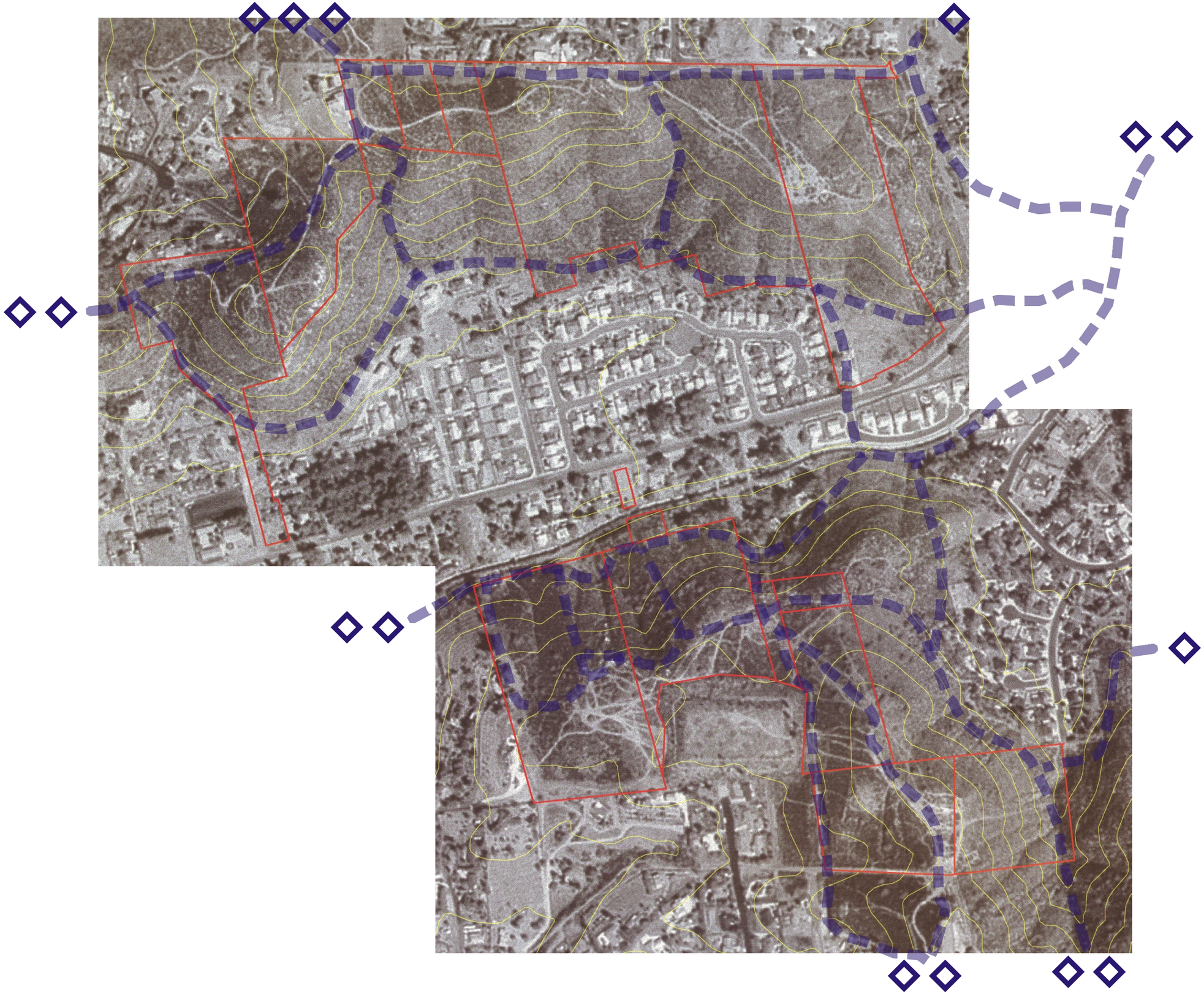


Figure 3.8-5
Study Area Potential Wildlife Movement Corridors
MSCP Lakeside Archipelago Lands
San Diego County, California

Potential Wildlife Movement Corridor

Potential Connectivity Value:

High

Moderate

Low

N

Scale: 1 centimeter = 50 meters (1:5000)
Base Map Source: County of San Diego
Dept. of Planning & Land Use 2001
(aerial photo source dated January 1997)

Hypothetical wildlife movement corridors are shown schematically in Figure 3.8-5 for the study area and immediate surroundings. These corridors are generalized rather than focused toward any particular wildlife species. See the discussion immediately below for brief details on the routes shown. Relative wildlife movement corridor quality is indicated on the figures with 1 to 3 diamonds, indicating a potential connectivity value of "high", "moderate", or "low". The intended intervals in potential value separating each step are an order of magnitude or greater, conceptually. This categorization combines subjective evaluations of the above-mentioned concept of impedance plus the extent and quality of resources potentially reached by that route, and is generalized for corridor-utilizing wildlife judged to have potential to occur on the study area (see Appendix G). Note that only one route (that with 3 diamonds) appears to lead directly to extensive open space, as discussed below. This same route currently lacks protection from future development.

This 3-diamond route, abutting the east site, is a narrow (about 35 m wide) connection at the northeast corner with Diegan Coastal Sage Scrub that is apparently preserved open space. Signs indicate it is under the management of the Center for Natural Lands Management. That area of sage scrub extends east nearly to Lake Jennings Park Road and Lake Jennings, broken at this time only by a single, narrow road (Lakeview Road). A tenuous open space connection is present at both sides of Lake Jennings Park Road, but appears to be rapidly being developed, with the road a fairly busy, multilane regional arterial. From Lake Jennings extensive areas of natural communities in open space are accessible. This is the only clear connection extant between the study area and extensive open space, as all other areas of open space accessible from either site appear to be no more than moderate in size and themselves isolated by substantial tracts of intensive use development.

What appears to be the second best connection of the sites with other open space is between the west site and areas to the south. The south and southwest edges of the west site broadly connect with extant sage scrub which extends toward Interstate 8 to the south. However that remaining natural area is broken by several roads and smaller, open residential areas before reaching the interstate. Across the interstate is additional sage scrub which directly connects with extensive, natural open space to the east and north.

There do not appear to be any other potential routes by which an animal might travel by foot to reach other open space without traveling through entirely developed areas for a distance of well over 0.5 km.

In the past, Los Coches Creek appears to have been an important wildlife movement corridor and landscape linkage. Today it is an open creek upstream from Los Coches Road and for several hundred feet thereafter, but surrounded by development. Before reaching parallel to the west site, it becomes an open concrete channel with vertical sides 3 to 5 m tall and surrounded by chain link fencing, and remains as such until reaching the San Diego River. At this time there is no direct open space connection to the study area.

Many native plants and microinvertebrates on the study area have dispersal mechanisms that may depend on the availability of wildlife movement corridors (e.g., seeds that stick to fur). Given the lack of knowledge regarding the natural history of these species-specific mechanisms it is impossible to say how successful these populations can be in the current (or future) landscapes at the study area.

Arguably the most critical issue at the study area with regard to connectivity is the potential for movement between the two sites for larger mammals such as American Badger, Mountain Lion, Mule Deer, Raccoon, and Bobcat. The first three of these are covered by the MSCP. No indication of any of these but Bobcat was found on the study area during the current work. It is unclear whether Bobcats move between the two sites or simply are present on both sides, and none of the other four species are expected to occupy either site based on habitats present and degree of isolation and disturbance. As mentioned above with regard to wildlife movement corridor evaluation, these are probably the primary, "target" species for the issue of corridor viability at the study area. The minimal rate of passage for viable connection is probably about one individual per generation for a given species, as discussed in a recent review of the issue by population geneticists (Mills and Allendorf 1996).

None of the anecdotal indicators associated with effective regional-scale wildlife movement corridors are present at the study area. These include, based on prior experience of the biologist, some combination of: (1) detected presence of mammals requiring extensive space and/or seasonal movement (e.g., deer, Mountain Lion), (2) mammalian ectoparasites such as ticks (order Acari, suborder Ixodides) and deer louse flies (order Diptera, *Lipoptena depressa* and/or *Neolipoptena ferrisi*; see Hogue 1993), (3) a reasonable or better frequency of Turkey Vultures, and (4) accessible pathways "suggested" by topography and accessibility. All of these are found in the vicinity and at other, similar locations in San Diego County.

Recommendations to address issues and needs regarding connectivity at the study area are provided in Sections 4.1 and 4.2.

3.9 Study Problems, Limitations, and Data Gaps

Virtually no problems were encountered during the current study in developing the data presented in this report. Specific issues of limitations arose during development of the scope of work and/or during the current work itself that limit the specificity, precision, breadth, or accuracy of information and conclusions that can be presented here. In many cases the limitations are that of a single year of study, and thus can be addressed in the future. The list of limitations presented below is not exhaustive, but provides a basis for proper interpretation and use of the data and a context for the conclusions provided. Nearly all issues identified below result from necessary limitations to the contract scope, budget, and time frame that could be provided for the work and were thus agreed upon when the original study design was approved.

Limitations

(1) systematic biases are present in timing of field work (e.g., time of day, days of the week, and times of year);
(2) field work was limited to a single, 5-month period in a single year of near-average weather;
(3) only limited literature search and review, data searches, and contacts with outside experts were performed;
(4) no research was conducted on the human history of the study area;
(5) no formal data gathering or analysis was performed of the study area's historical ecology (see Egan and Howell 2001 for discussion of methods for such work);
(6) there are various inherent limitations to all of the methods and associated levels of effort (e.g., sample size, particular level of observer expertise, quantification, and comparability with other studies);
(7) only limited and subjective data were gathered on geology, soils (e.g., non-random sampling to gather samples retained but not later analyzed due to budget limitations), and biological crusts;
(8) vegetation mapping did not include quantitative analysis of ground litter or deadwood, potentially obscuring to some degree issues such as shrub senescence;
(9) no quantitative sampling was performed for invertebrates, amphibians, reptiles, or mammals, due to limited budget. Such methods are available (e.g., Heyer et al. 1994, Wilson et al. 1996, Sutherland 1996, Thompson et al. 1998, Agosti et al. 2000, and many others) and recommendations provided in this report address prioritization of work including these potential measures;
(10) an absence of explicit data on CaGn movement between the two sites (but see the discussion at the end of Section 3.8.4, above); and
(11) only limited field work was performed to evaluate the surrounding landscape context for the study area.

3.10 Findings

The following bulleted findings include references to sections where the data are presented and discussed.

- The study area is small (45.81 h), fragmented, and nearly isolated from large regional open spaces. It consists primarily of Diegan Coastal Sage Scrub of variable density, generally dominated by California Buckwheat and California Sagebrush. It lies at the inner edge of the coastal plain in San Diego County, in a context of altered hydrology and rapid urbanization (Sections 1.0, 3.2, and 3.8.4).

- On the whole, biological resources and some natural functions on the study area appear fundamentally intact, with a good species richness of plants, especially in the herb layer, and an apparently intermediate species richness of invertebrate and vertebrate animals (Sections 3.3 through 3.6).
- The study area primarily abuts existing residential development with minimal impact buffering. However, some adjacent areas of currently unprotected sage scrub (south end of west site, south and west edges of east site) do provide important buffering, additional habitat, and lower the effective edge-to-area ratio for existing open space (Sections 3.2 and 3.8.4).
- A total of 6 to 8 occupied home ranges of California Gnatcatchers are present on the study area and adjacent habitat. Most (57% to 100%) of these home ranges are partly on and partly off of the study area (current data developed from adjacent areas are not included in this report). Productivity for this species during the study was uncertain, but appears to have been low to moderate. It appears likely that gnatcatchers can disperse across the habitat gap at the study area at functional rates, and, somewhat speculatively, that the study area is not currently isolated from extensive populations of gnatcatchers either to the north or south (Section 3.8.1).
- Potential wildlife movement corridors are present, but the single route leading directly to extensive open space (east of the east site by way of Lake Jennings) is tenuous and appears to be undergoing rapid development, with construction observed in that area during the study. It is unclear, but somewhat doubtful, whether an effective wildlife movement corridor remains between the two sites of the study area except for birds and strongly flying invertebrates (Section 3.8.4).

Table 3.10-1, below, summarizes by site the totals for several data sets developed at the study area. Note that the west site also contains a very small amount of native Valley Needlegrass Grassland, not shown in the table. A total of at least 427 species of plants and animals were detected during the current work, but the actual total is believed to be much higher, perhaps 20% more for plants and several-fold more for invertebrates than the number of morphospecies recorded. Additional vertebrates expected are listed in Appendix G.

Table 3.10-1. Summary of Data for the Two Sites

Site	Total Area*	Diegan Coastal Sage Scrub*	Plants Detected**	Invertebrates Detected**	Vertebrates Detected + Expected**	CaGn Home Ranges***
West Site	18.78 h.	16.81 h. (89.5%)	187	89	76 + 88 = 164	3
East Site	27.03 h.	22.17 h. (82.0%)	172	99	80 + 87 = 167	3 to 5
Study Area	45.81 h.	38.98 h. (85.0%)	213	118	96 + 72 = 168	6 to 8

*- Areas are in hectares; percentages are portion of site in sage scrub.
** - Totals are for species (morphospecies for invertebrates).
*** - "CaGn" = California Gnatcatcher; refers to both partial and entire home ranges within boundaries; see Section 3.8.1 for explanation and discussion of "use area".

The most time-critical problems regard relatively near-term threats to continued function and integrity of the sites. Roughly prioritized, these problems are: (1) incipient loss of connectivity (see above); (2) vulnerability to continued or accelerated degradation under the current preservation boundaries (see Smallwood 2001), (3) the accumulating effects of past fire suppression on the east site and most of the west site, (4) effects of invasive pest plants that are either established (e.g., Short-pod Mustard, Tocalote) or threatening to become established (Hottenton-Fig, Fountain Grass, Tree-of-Heaven), (5) potentially excessive predation rates and resulting low productivity for birds and rodents due to mesopredator release and/or disturbance, (6) excessive disturbance by a combination of past impacts and more recent and current direct use (primarily, too many trails, unauthorized access by off highway vehicles and bicycles, and unleashed pets), and (7) a need for continued active

management, including gathering of additional reference information and ongoing field work as a basis to evaluate management measures and identify new study area needs at early stages. Measures suggested to address these problems are provided in Section 4, below.

4.0 RECOMMENDATIONS

These recommendations are intended as prioritized suggestions to address the need for successful preserve management under the MSCP, and not as directives or imperatives. Thus, these recommendations are not intended to narrow the list of all options, but to suggest particular options supported by the available data and to clarify some of the potential costs and benefits of those options.

4.1 Needs at the Study Area Scale

Recommended measures are provided below under 2 headings, Management Needs and Information Needs. Within each, the measures are roughly prioritized from highest to lowest. Recommendation 1 is clearly the most important overall, but recommendations 2 through 5, in particular, are judged to be time-sensitive and it is important that these measures receive attention sooner than a fully-developed management plan can probably be put in place.

4.1.1 Management Needs

- Recommendation 1 (comprehensive study area management plan): This is the most important measure given that recognition that such management will be evolving, adaptive, and not cause time-sensitive recommendations below to be delayed while all input is being developed. The plan should incorporate the information and recommendations presented in this report, as well as coordinating with adjacent CNLM management area specific management directives.
- Recommendation 2 (study area integrity): The study area appears to be quite vulnerable to continued development of adjacent open space, and is probably of insufficient size to maintain the substantial levels of functions, values, and species richness in the absence of these buffering areas. Conserving and actively managing as much of the contiguous open space as possible may be the most direct way to do this. This would also have potentially important MSCP-scale benefits.
- Recommendation 3 (managing trail impacts): Selection, closure, reconstruction and management of trails should be planned for multiple use. About 10 of the 15 public access points discussed in Section 3.7.3 should be closed; the specific points kept open should be based on county management needs and public input. It is also expected that it would be highly beneficial to current resources to close (block off and monitor for success) at least 75% of the current trails (by length) including all trails less than about 1 meter in width. Then, repair and maintain the remainder using trail designs from qualified trail builders to minimize impacts to adjacent natural areas, especially from erosion. This may involve working with organizations such as the California Recreational Trails Committee or private contractors specializing in low impact trails, and/or providing special training for one or more county employees. See Flink et al. (2001) for examples of specific guidance and designs. Detailed selection of trails to be closed is not provided here, as new trails can appear, new issues can arise, public input is an important element to support acceptance, and if work is delayed, the current selections might no longer be valid.
- Recommendation 4 (managing pest plants): Act promptly to remove exotic pest plants, prioritizing from the most aggressive but least well-established to the least aggressive and most well-established; in this regard, the west site needs the most immediate attention (e.g., Hottentot-Fig, Fountain Grass, Tree-of-Heaven). The work should be done by persons experienced and qualified with such measures.
- Recommendation 5 (managing pest plants): Try to address the problem of ongoing weed propagation at the covered reservoir adjacent to the west site by working with the water district. It is possible that this area

could be used as a study area for a restoration project / mitigation bank, especially if the land owner could benefit from gaining mitigation credit (for, say, placement of a water tank elsewhere).

- Recommendation 6 (managing pest plants): It may be advisable to use a pre-emergent herbicide and, depending on soil chemistry, perhaps modification of nutrient availability to control Short-pod Mustard and Tocalote on the study area. Prioritize from interior natural community "holes" in the highest quality sage scrub downward to efforts at the site boundaries and along well-established trails. It is very important that the work be done by persons experienced and qualified with such measures.
- Recommendation 7 (mitigating fire suppression effects): Try to find a solution to the buildup of deadwood in the portions of the sites with relatively high cover. Two serious problems with conducting controlled burns is the adjacency of residences and the fact that the site is so small and isolated that there is little opportunity to wildlife on the site to move and then return and recover as the vegetation recovers. Mechanical removal may be one option. Note that in interior sage scrub communities in the Great Basin, methods to thin older stands using herbicides appear to be having success (Olson and Whitson 2002). It is very important that the work be done by persons experienced and qualified with such measures.
- Recommendation 8 (evaluate the impact of mesopredators): Conduct a study to evaluate both the abundance and impact of mesopredators, including both nonnatives (e.g., Domestic Cat, Domestic Dog, Virginia Opossum) and natives (Striped Skunk, Bobcat, Common Gray Fox, etc.). It is very important that the work be done by persons experienced and qualified with such research.
- Recommendation 9 (managing fuel modification zone impacts): Notify adjacent landowners that after a certain date, the county will be maintaining fuel zones on the study area, and any brush removal or trash dumping (including yard waste) may subject them to fines. Manage fuel modification zones in a manner based on accurate information and incorporating all of the needs and responsibilities of the county.

4.1.2 Information Needs

- Recommendation 10 (public input): Solicit and incorporate information from the public: have a single, assigned public contact for the study area, and formally solicit public input on concerns, observed conditions, activities, wants and wishes. Examples of useful activities at the local level are: annual public forums to get and give information; preserve Web pages (including rules, map, species lists, management issues, and opportunity for public input); and working with other landholders (including the Center for Natural Lands Management) to coordinate management of adjacent spaces and avoid conflicts.
- Recommendation 11 (wildlife movement corridor restoration): This is potentially an extremely valuable measure if feasibility can be achieved. Investigate options for restoring terrestrial wildlife movement along Los Coches Creek between the two sites. To do this, perform an evaluation of options for alterations to current stormwater engineering features on adjacent Los Coches Creek (e.g., "rescue" structures providing access out of the channel and onto the two study area sites for wildlife). This work should include input from relevant agencies on cost feasibility and from a properly experienced and qualified biologist on expected efficacy for all of the various options.
- Recommendation 12 (reference wildlife data and data on potential mesopredator problems): Have an experienced and qualified biologist conduct a mixed-method quantitative sampling survey for small mammals (e.g., pitfall traps and live-traps). This data may contribute to a clearer picture of whether the site is currently undergoing impacts from an overabundance of mesopredators, as well as contributing to an understanding of the site's fauna and wildlife functions. This measure and the resulting information should be coordinated with that of recommendation 8, above, for form a coordinated evaluation and plan.
- Recommendation 13 (reference vegetation data): Have an experienced botanist qualified in field identification of MSCP covered species check portions of the study area with the most promise for unusual and/or special status plants (e.g., drainages, the south slope of west site) and to augment the floral list.
- Recommendation 14 (California Gnatcatcher data): Conduct population estimates for Coastal California Gnatcatcher every 4 or 5 years, during the breeding season, using a spot-mapping methodology for home ranges. Field work should be designed to generate a data sample size adequate to estimate the numbers of home ranges with an accuracy of plus or minus about 10%. We recommend an assumption that this will

require 48 field hours for a highly qualified biologist, and as discussed at the end of Section 3.8.1, total costs may be projected at about $1900 per year. As also discussed in that section, we do not recommend either more frequent focused work for this species or work using a presence/absence protocol due to resulting adverse impacts to a small and particularly vulnerable population. As with the prior recommendation (#14), the observer should be a very qualified biologist with at least average hearing ability in the range of vocalizations for this species. Given such qualifications, use of the same observer(s) over a long period is less critical for this work than for general avian point counts.

- Recommendation 15 (ongoing wildlife data): Conduct ongoing general reconnaissance at a rate of 1 day every 3 months (e.g., Dec. - Feb., Mar. - May, June - Aug., and Sept. - Nov.), with 3 memos and 1 report per year, including annual reports incorporating both the reconnaissance and point count (recommendation below) results. This work should be conducted by a broadly qualified and very experienced biologist, due to the wide sweep of such work.
- Recommendation 16 (ongoing wildlife data): Conduct ongoing avian point counts at the 10 established point count stations. In order to detect local population change on a time scale of less than a decade or more, point count sets should be conducted at least once every 3 months, and preferably every other month. Given the long time frame, the need to pool data, the study area acoustics (substantial and increasing background noise) and the diversity of potential species, it will be especially important to seek (1) consistency in observers over time at a site, as observer to observer variation is probably the greatest source of potential bias, and (2) a qualified biologist with local experience and average or better hearing ability (preferably tested and documented every 2 to 3 years).
- Recommendation 17 (reference soils data): In conjunction with any natural community restoration efforts (recommendations 3 through 7, above), conduct a stratified random sampling for soils using about 30 points per plant community type per site. Analyze the samples for water permeability, pH, available nitrogen, available phosphorus, iron, and magnesium. This will help to identify or rule out differences in soils that may need to be addressed as a basis for study area management measures, such as modification of nutrient availability for restoration (e.g, Herron et al. 2001, Hey 2002). All of this work should be done and interpreted only by experienced and qualified personnel.

4.2 Needs of the Study Area at the MSCP Scale

Study area needs at the MSCP scale include addressing the following issues.

- Recommendation 18 (list study area functions): Develop a prioritized list of study area contributions to the functions and values of the MSCP, as part of a basis for a local site or preserve management plan.
- Recommendation 19 (prioritize threats): Determine and prioritize threats to those functions and values at the study area.
- Recommendation 20 (prioritize information needs): Develop and maintain a prioritized list of MSCP information needs and the progress made on them.
- Recommendation 21 (multi-scale adaptive management): Coordinate adaptive management of threats between the study area and MSCP scales.
- Recommendation 22 (reference evaluation standards): Develop an explicit, concrete methodology for initial reference evaluations of MSCP lands. This should include rigorous study design, choice of focus species groups and other issues to address (with survey methods and tests for data sufficiency) and report content requirements including presentation of study problems and limitations, inventory results, identification of top priority management issues, and information needs across relevant scales. It should be explicit that the work be performed in light of and interpreted against current, published conservation biology and land management methods and research.
- Recommendation 23 (management plan): Study area management will benefit greatly from a coordinated, detailed management plan for natural resources at the MSCP or higher level, but addressing management measures by site. Seek broad input and make documents accessible (e.g., Internet) after peer review.

The following land management issues are best addressed at the MSCP scale and are also judged likely to be having important adverse impacts on the study area at this time. They are examples of relatively intractable problems of land use conflict at the interface of human development and natural open space. Solutions should be sought in the long term. A first step is to conduct rigorous studies of the nature and degree of each problem at the MSCP scale. Next, identify a range of potential solutions that may succeed in preventing, modifying, or mitigating the impacts. With ongoing public education and discussion, it is likely that most can be at least minimized with a concerted effort over a period of years.

- Recommendation 24 (pets and other nonnative animals): Control incursion of pets into open space and release of unwanted animals, as well as educating the public on yard maintenance measures to discourage effects that support an artificially high abundance of mesopredators (e.g., outdoor pet food).
- Recommendation 25 (dangerous structures): Limit and manage construction of new sources of bird strikes and predator perches in and adjacent to natural open spaces. This includes power line poles, radio and cell phone towers, CB radio antennae, tall fencing, water tanks, bridges, road signs, and any other signs.
- Recommendation 26 (stewardship by the public): Conduct an education program for residents living close to natural open space. This should address fire, human impacts on natural areas, and how to manage private lands adjacent to open space to minimize problems such as dealing with snake incursions and foraging by wildlife in yards. An excellent example document is RCRCD (2002).
- Recommendation 27 (fuel modification zone management): Address the issues of fuel modification zones and their impacts to open space. Do this first through studies of impacts and long term efficacy at a landscape level, then through efforts toward changes in zoning and land use regulations, and finally with coordinated management such as placing zones under regional control where such zones can be properly placed and maintained.
- Recommendation 28 (peer review): Given the volume of information and rapid growth of fields of study relevant to sound management of the MSCP, a formal peer review process for all substantive MSCP studies should be instituted. This should include reports for reference evaluations, site management plans, ongoing site management activities, and research studies. It is important that this be structured in a non-confrontational manner, with an understanding that no one person or agency is without blind spots and that contribution by a wide spectrum of participants is needed for successful evolution of the MSCP effort.

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