Proposed 2014

Santa Monica Mountains
Appendices

A Component of The Santa Monica Mountains Local Coastal Program
County of Los Angeles Department of Regional Planning

Santa Monica Mountains Local Coastal Program

Technical Appendices

Photograph by Michael J. Portanova

January 2014

County of Los Angeles
Department of Regional Planning

TABLE OF CONTENTS

ACKNOWLEDGMENTS

The following persons are acknowledged for their contributions to the preparation of these technical appendices to the Santa Monica Mountains Local Coastal Program. Without their expertise and hard work, the preparation of these technical appendices would not have been possible. The Department of Regional Planning is grateful for their many hours of service and contribution to this planning effort.

Department of Public Works

Dai Bui
Conrad Green
Karen Vazquez
Barry Witler

Department of Regional Planning

Joseph Decruyenaere

Also

Dr. Daryl Koutnik
Melissa Brizee
Clement Lau

APPENDIX A
BIOTA

A CONSERVATION ANALYSIS FOR THE SANTA MONICA MOUNTAINS "COASTAL ZONE" IN LOS ANGELES COUNTY

Determination and Delineation of Environmentally Sensitive Habitat Areas (ESHA) and Other Habitat Classifications

Prepared for: County of Los Angeles, Department of Regional Planning

Prepared by:
Daniel S. Cooper
Cooper Ecological Monitoring, Inc.
255 Satinwood Ave.
Oak Park, CA 91377

Robert A. Hamilton
Hamilton Biological, Inc.
316 Monrovia Ave.
Long Beach, CA 90803

October 22, 2012

Revised January 3, 2014

EXECUTIVE SUMMARY

The County of Los Angeles, Department of Regional Planning (County), is working with the staff of the California Coastal Commission (CCC) to prepare a local coastal program (LCP) for the Santa Monica Mountains Coastal Zone of Los Angeles County (hereafter the Study Area). The Study Area comprises a largely intact landscape of approximately 52,000 acres. More than half of the Study Area consists of protected public parkland and reserve, and much of the remaining land consists of large, undeveloped parcels restricted as to the intensity of residential or commercial development that may occur (typically limited to one single-family home per legal parcel). Development in the Study Area is characterized by a lack of subdivision-type housing areas and very limited commercial areas, mostly contained in discrete, scattered "rural villages". Because all undeveloped open space contributes meaningfully to the "habitat mosaic" of the ecologically rich Santa Monica Mountains, our findings support continued implementation of strict development standards in the Study Area.

For the past decade, the CCC has delineated virtually all undeveloped land in the Study Area as Environmentally Sensitive Habitat Area (ESHA) in satisfaction of criteria in Section 30107.5 of the Coastal Act. At the County's request, we have reviewed the best available scientific information and completed what we believe to be the most comprehensive analysis of biodiversity in the Study Area to date. Our findings lead us to conclude that roughly 6,000 acres of mapped vegetation in the Study Area satisfy the ESHA criteria in Section 30107.5. These consist mainly of native woodlands and riparian habitats, with smaller areas of grassland, rock outcrop, coastal bluff scrub, seeps/springs, and alluvial scrub.

In addition to ESHA, we propose two additional resource-protection overlays:

- "Stewardship Habitat" refers to parts of the Study Area that do not satisfy ESHA criteria but that nevertheless provide relatively high ecological values. Most Stewardship Habitat consists of large blocks of undisturbed vegetation; examples are Interior Chaparral and Buckwheat Scrub.

- "Restoration Habitat" refers to vegetation that likely satisfied ESHA criteria in the past, and that continues to retain important ecological values, but that is periodically disturbed for pre-authorized/mandated activities – mainly clearing of brush for fire or flood control. Since legal, ongoing habitat disturbance is incompatible with the very definition of ESHA, such areas cannot be properly designated as ESHA even if they possess high ecological value.

We also discuss areas of habitat that should be treated as buffers to safeguard the most sensitive, typically ESHA-level, resources in the Study Area.

We acknowledge that undeveloped lands in the Study Area that are not identified as ESHA, Stewardship Habitat, or Restoration Habitat nonetheless provide valuable habitat sustaining numerous populations of native plants and wildlife of the Santa Monica Mountains. We use the term "Habitat – Other" to distinguish these natural areas from houses, gardens, and other forms of existing development.

Our approach to conservation planning in the Study Area is modeled, in part, on the City of Malibu Local Coastal Program, Local Implementation Plan. For example, under that plan "chaparral ESHA" and "coastal sage scrub ESHA" are afforded different protections

than “riparian ESHA”. We conclude that this type of tiered approach represents an improvement over the current approach, in which nearly the entire Study Area is identified as ESHA but each parcel retains development rights – regardless of the sensitivity of its resources – due to legal limitations on depriving land owners of viable use of property. Recognizing multiple levels of rarity, ecological value, and sensitivity of natural resources to human activities enables biologists and planners to develop land-use policies that can target the most sensitive or otherwise strategic areas for protection (e.g., through transfer of development rights and provision of buffers around habitat areas of high ecological sensitivity). We believe that the approach identified in this Conservation Analysis will facilitate the overarching goal shared by the County and the CCC, which is to effectively protect the natural resources of the Santa Monica Mountains Coastal Zone into the future.

TABLE OF CONTENTS

INTRODUCTION

The Santa Monica Mountains are an east-west trending range located in coastal Ventura and Los Angeles counties. These mountains comprise approximately 205,000 acres, roughly 155,000 acres of which are considered "vegetated" or undeveloped (T. Tiszler, NPS, in litt.)[1]. Within this range, Los Angeles County's "Coastal Zone" (hereafter the "Study Area"; Figure 1) extends approximately five miles inland from the coast, excluding the City of Malibu, which occupies much of the immediate coast. The Study Area comprises approximately 52,000 acres (80 square miles) of unincorporated land, approximately 90 percent of which is undeveloped and approximately 53 percent of which is publicly owned (almost all of it parkland). It is bounded on the east by the City of Los Angeles, on the west by Ventura County, on the north by the Santa Monica Mountains "North Area", and on the south by the City of Malibu, with small areas of coastline represented at either end (Leo Carrillo State Park in the west and Topanga Beach in the east). The Study Area is characterized by dramatic and varied topography, with numerous deep, parallel canyons that drain south into Santa Monica Bay. Most of these canyons originate at or near the northern Study Area boundary, but Malibu Creek extends well inland to the Simi Hills and drains approximately 67,000 acres of watershed into Malibu Lagoon (in the City of Malibu). Owing to aggressive acquisition of parkland by multiple public agencies, restrictions on development, and forbidding topography (around 80 percent of the land is on slopes greater than 25 percent), the landscape of the Study Area retains a largely wild character. Over time, human settlements of moderate scale scattered across the Study Area have become surrounded by natural parkland, a reversal of the pattern observed in most parts of coastal southern California (Figure 2). At a larger scale, the open space of the Santa Monica Mountains as a whole has become increasingly isolated from larger areas of open space to the north, owing to continuing development along U.S. Route 101, including the cities of Calabasas, Agoura Hills, and Thousand Oaks. However, very little of the remaining open space in the Study Area remains available to development of any type.

For nearly a decade, the California Coastal Commission (CCC) has designated as Environmentally Sensitive Habitat Area (ESHA) nearly all open space under the jurisdiction of Los Angeles County (County) in the Study Area. The County Department of Regional Planning is working with CCC staff to prepare a Local Coastal Program (LCP) for the Study Area. As part of this process, the County has contracted with Daniel S. Cooper, President of Cooper Ecological Monitoring, Inc., to review the current ESHA designation and to ensure that this and other land-use restrictions in the LCP reflect actual environmental conditions, as reflected in data from numerous ecological research projects conducted in the Santa Monica Mountains, many of which have been completed – or whose results have been made accessible – in recent years. To complete this study, Mr. Cooper has collaborated with Robert A. Hamilton, President of Hamilton Biological, Inc. The authors recently completed and received Coastal Commission concurrence on the Conservation and Management Plan for Marina del Rey, which lies entirely within the Coastal Zone in southern Los Angeles County.

[1] As of 2009, 153,250 acres of undeveloped land was contained within the boundary of the Santa Monica Mountains National Recreation Area (http://www.nps.gov/samo/parkmgmt/statistics.htm)

Figure 1. Coastal Zone of the Santa Monica Mountains (blue shading). Note that most of the “coastal strip” of Malibu is not treated in this analysis, as it lies south of the Study Area.

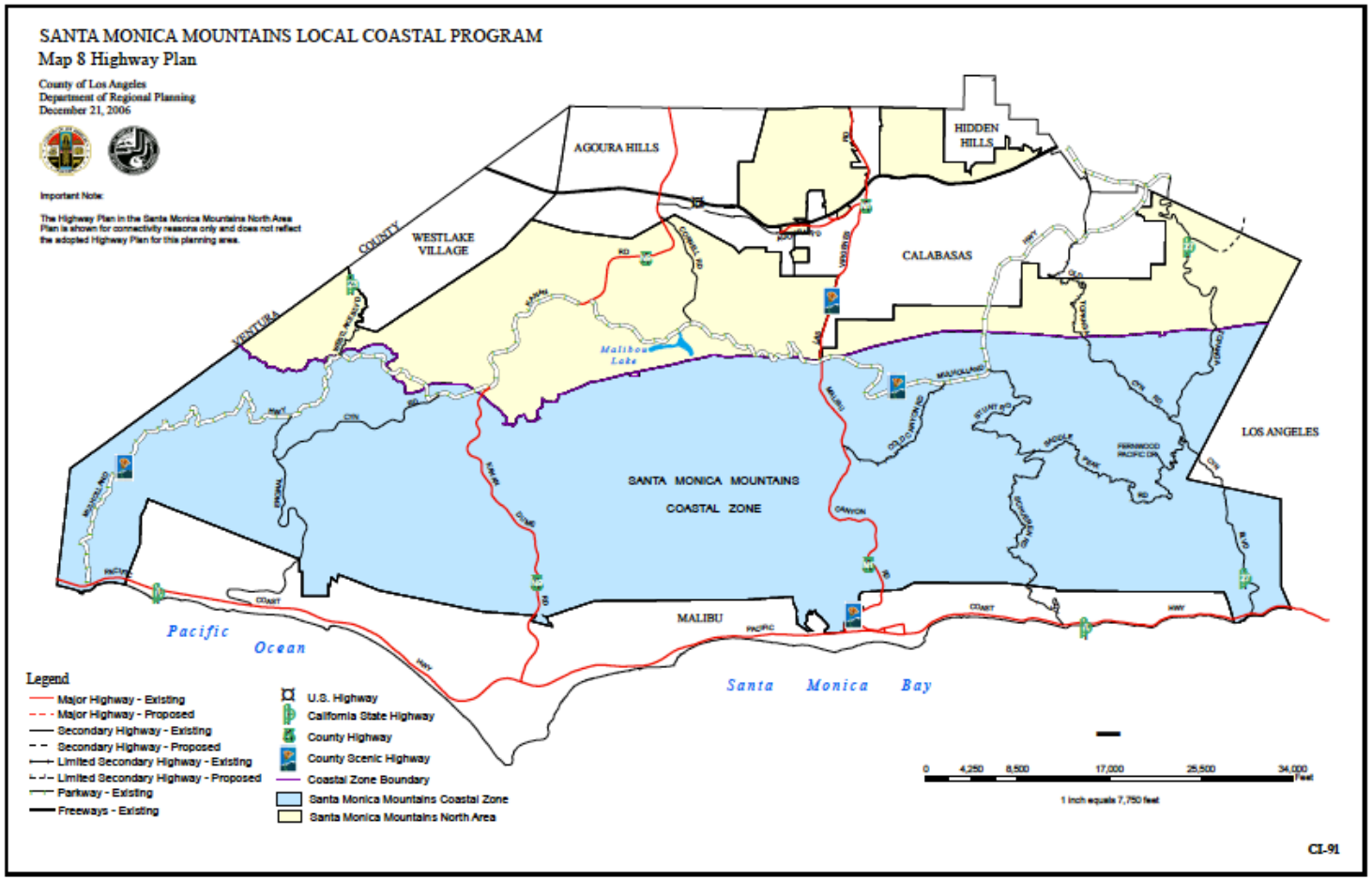
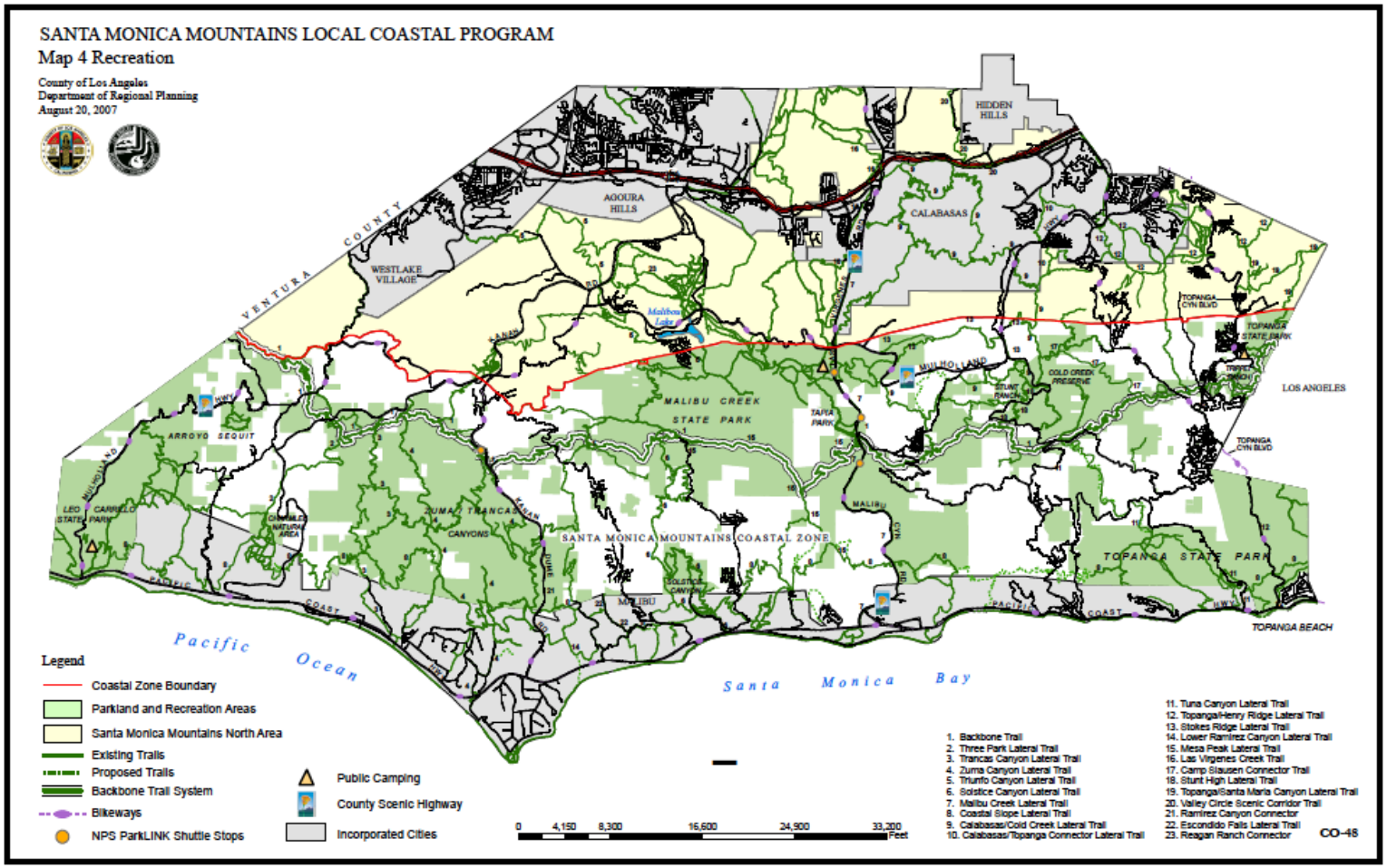


Figure 2. Parkland areas of the Santa Monica Mountains Coastal Zone as of 2007 (red line indicates northern boundary; city of Malibu shaded gray to the south). Numerous additional acquisitions have subsequently added to this acreage.



Development of resource-protection policies is undertaken in the context of various local, State, and federal regulations applicable to parcels of undeveloped land in the Study Area. Page IN-4 of the County's draft LCP, dated February 2012, discusses various non-Coastal Act regulations that apply to land development in the Study Area:

> Along with the standard building requirements and zoning regulations that apply Countywide, developments in mountainous areas often require additional review and permitting from local, state, and federal agencies. These controls are often intended to ensure compatibility with off-site resources, such as downstream water quality and coastal areas, in addition to regulating on-site impacts. For example, onsite wastewater treatment systems may require approvals from several agencies due to grading, soil conditions, water table, etc. These other agencies that may require review and permitting include the County Departments of Public Works and Health Services, and the California Regional Water Quality Control Board. Proposed streambed alterations[2] would require permits from the California Department of Fish and Game as well as the U.S. Army Corps of Engineers, in addition to compliance with County site design regulations. Other agencies may be involved, depending on the development proposed.

The regulations and policies referenced above are in addition to those that will be contained in the LCP itself. The Conservation and Open Space Element of the LCP will provide the resource protection framework that will allow the final LPC to be certified as compliant with the Coastal Act.

Page CO-13 of the draft LCP describes the LCP's guiding principle.

> The guiding principle for managing the natural environment is:
>
> **Resource protection has priority over development.**
>
> The Santa Monica Mountains Coastal Zone is a complex and naturally dynamic landscape. The scenic beauty and ecological diversity of the area, in close proximity to the second-largest urban population in the United States, require responsible policies and action programs in order to be effectively managed and protected. Much of the Coastal Zone's remaining undeveloped land consists of steep slopes, which are generally covered with a variety of native undisturbed vegetation. As such, future development likely will require extensive grading to provide a building site and fuel modification to minimize risks associated with fire, resulting in the removal of substantial habitat areas.
>
> This guiding principle acknowledges that the Santa Monica Mountains possess irreplaceable resources and that every user of the land is a trustee of the area's heritage for future generations. Given this perspective, sensible resource management works to balance the many demands of the land. The area's positive contributions to the Los Angeles region, including the scenic, recreational, and educational benefits it offers, rely upon sustaining the area's natural setting.
>
> Development on any scale has the potential to disrupt the character of the underlying natural setting, both in the immediate area and offsite. Development must be sensitive to a full range of environmental factors to ensure compatibility with the natural and built environments. In scenic and environmentally sensitive areas, development must be guided by and integrated with the natural setting.

[2] Now known as an LSAA (Lake or Streambed Alteration Agreement). It is not a permit *per se*, but an agreement.

> The provisions of this element provide detailed guidance for locating new development so that it conforms to the constraints of the mountain topography, does not detract from the area's character, and protects natural resources.

The large land area of the Study Area, its extensive network of protected parkland, its long history of scattered and isolated developments, and the very large number of undeveloped legal lots, all point to a need to address resource protection in a comprehensive fashion. We believe that, with careful planning, the associated concomitants of development (grading, physical presence of structures, roads, and fencing, and fuel modification activities such as vegetation removal and thinning,) may be designed and directed in a way that allows the Study Area's sensitive biological resources to persist. In order for the County to effectively plan and implement conservation efforts in coordination with future development in the Study Area, it is imperative to identify the areas that satisfy the Coastal Act's ESHA criteria (as defined and administered under State law). Part of this process involves distinguishing between ESHA and habitats that, while important and deserving of protection, do not rise to the level of ESHA. The analysis must also consider other resource-protection designations that may be applied at the County, State, or federal levels. Finally, we must take into account the existing network of protected areas, including State and federal parklands and lands owned by non-governmental organizations, which work in concert to support the ecological integrity of the Study Area and afford protection to habitats that might otherwise be more threatened if located outside of these large reserves. This report represents our contribution to what the County envisions as an open, deliberative, science-driven process to describe and delineate ESHA (and other areas of ecological importance) and to develop a comprehensive suite of appropriate and effective land-use policies applicable in the Coastal Zone of Los Angeles County.

ESHA Criteria and Allowable Uses

Since a major focus of the study involves identifying and delineating those parts of the Study Area that satisfy the Coastal Act's criteria for ESHA, we provide those criteria here. Section 30107.5 of the Coastal Act defines "environmentally sensitive area" as:

> … any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.

The California Coastal Commission (CCC) utilizes this definition in assigning the ESHA designation to areas under its jurisdiction. Under Section 30240 of the Coastal Act:

> (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.
>
> (b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

These key passages from the Coastal Act represent the guiding principles upon which we base the analyses and resource-protection recommendations contained in this report.

Study Goals

The goals of this study are (1) to review and evaluate issues related to the delineation of Environmentally Sensitive Habitat Areas (ESHA); (2) to identify other resource-protection overlays that may apply; and (3) to recommend guidelines for biological studies to be completed in association with future projects on individual private parcels within the Study Area. It is our understanding that findings and recommendations of this study will be incorporated into the next version of the LCP, which will be adopted by the Board of Supervisors and ultimately submitted to the CCC for certification.

Our analysis of habitat distribution is largely based on mapping, which has its limits in terms of accuracy, both with respect to both spatial scale (no map can substitute for an on-the-ground site visit) as well as temporal scale (vegetation changes over time, both seasonally and as it matures, and due to unforeseen disturbance such as fire). Therefore, no amount of mapping, however accurate, can reliably identify all areas of ESHA across the landscape, but will either under- or over-represent ESHA in any given area. Furthermore, certain sensitive resources may be present but unseen at any given time. For example, Braunton's milkvetch (*Astragalus brauntonii*) is rare a plant known from the Study Area that is most typically found in recently disturbed areas, such as on road-cuts or in recently burned areas. Any site supporting a population of this listed species certainly meets ESHA criteria, but short of searching the entire Study Area (and disturbing soil across a vast area) one cannot expect to know where all of the populations lie, or will develop.

The CCC recently addressed this general issue in its consideration of the Del Monte Forest LCP Update and Pebble Beach Company Concept Plan (CCC 2012:50):

> . . . determinations of whether ESHA is present must be based on an evaluation of both the resources on the ground and knowledge about the sensitivity of the habitat at the time of development consideration. This change is significant not only because it provides the appropriate analytic context for evaluating ESHA in the LCP, but also because it eliminates LCP language that had been interpreted by some as defining only a static list of ESHA for all time in the Del Monte Forest based on evaluations from the 1980s.

Consistent with this direction, we provide a set of recommendations for survey guidelines that will allow fine-scale ESHA delineations to be completed within individual private parcels on a case-by-case basis. The other purpose of the recommended guidelines is to help ensure that project-specific surveys are conducted using methods that will allow land owners and the County to determine the presence or absence of sensitive biological resources on a given parcel with an acceptable level of confidence, so that appropriate avoidance or other mitigation measures may be developed under the County's permitting authority.

METHODS

After carefully reviewing current CCC policy pertaining to designation of ESHA in the Study Area, we completed a thorough review of published and unpublished data on the distribution and abundance of species in the Study Area, much of which has not been available to previous investigators. We also researched the historical record of specimens

and sightings, another important analysis missing from prior evaluations. We supplemented these information sources by interviewing local experts and agency representatives, and by conducting field visits throughout the Study Area. Finally, we reviewed and analyzed recent vegetation mapping of the Study Area completed by the National Park Service (NPS; AIS/ESRI 2007).

Literature Review

We reviewed numerous studies, reports, and databases on the flora and fauna of the Santa Monica Mountains, with an emphasis on rare species and vegetation associations on both public and private lands. In order to reach scientifically defensible conclusions about what constitutes a rare species or habitat, we relied upon the classifications that agency personnel and consultants routinely utilize when preparing planning documents. In California, the primary lists of "special-status species" are the Special Animals and Special Plants lists (California Department of Fish and Game, Natural Diversity Data Base, 2011 and 2013). "Special Animals" and "Special Plants" are broad terms used to refer to all the taxa inventoried by the Department of Fish and Game's California Natural Diversity Database, regardless of their perceived rarity or legal/protection status. Following are summaries of the main categories of relative rarity addressed in the Special Animals and Special Plants lists (the language used is quoted from the introductory materials that accompany these lists):

- Taxa listed, or proposed for listing, as threatened or endangered by State or federal governments.

- Candidates for State or federal listing.

- Taxa that meet the criteria for listing, even if not currently included on any list, as described in Section 15380 of CEQA Guidelines.

- Taxa that the California Department of Fish and Game identifies as Fully Protected or Species of Special Concern. As described by the California Department of Fish and Game (www.dfg.ca.gov/wildlife/nongame/ssc), Species of Special Concern are native vertebrates that satisfy one or more of the following criteria: (a) is extirpated from California or, in the case of birds, in its primary seasonal or breeding role; (b) is listed as threatened or endangered by the federal government, but not the State of California; (c) meets the State definition of threatened or endangered but has not formally been listed; (d) is experiencing, or formerly experienced, serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status; and/or (e) has naturally small populations exhibiting high susceptibility to risk from any factor(s), that if realized, could lead to declines that would qualify it for State threatened or endangered status.

- Taxa that are biologically rare, very restricted in distribution, declining throughout their range, or that have a critical, vulnerable stage in their life cycle that warrants monitoring.

- Taxa closely associated with a habitat that is declining in California at an alarming rate (e.g., wetlands, riparian, old growth forests, desert aquatic systems, native grasslands, vernal pools).

- Taxa designated as a special-status, sensitive, declining, or watch-listed species by other State or federal agencies, or non-governmental organization.

With regard to the last category of taxa, we note that the Special Plants list refers extensively to the California Native Plant Society's Inventory of Rare and Endangered Plants (www.cnps.org/cnps/rareplants/inventory), which ranks plants by rarity and threat level inside and outside the borders of California, and which also maintains review lists and watch lists for species that are not believed to be truly "rare" in California. Plants with a California Rare Plant Rank of 1B are considered by CNPS to be "rare throughout their range with the majority of them endemic to California," although the threats to these taxa range widely. Rank 1B includes not only the rarest taxa, such as the federally endangered Braunton's milkvetch (*Astragalus brauntonii*), which has approximately 30 records in the California Consortium of Herbaria database since 1950 and is presumed by CNPS to be extant in just nine U.S. Geological Survey quadrangles, but also taxa with broader ranges that may occur in large numbers in many protected areas within those ranges. (By comparison, Plummer's mariposa lily (*Calochortus plummerae*) has approximately 160 records in the California Consortium of Herbaria database since 1950, and CNPS presumes the species to be extant in 64 U.S. Geological Survey quadrangles.)

We also reviewed pertinent local lists, such as the Los Angeles County's Sensitive Bird Species (Los Angeles County Sensitive Bird Species Working Group 2009) and lists of locally-uncommon plants maintained by NPS staff (T. Sagar, NPS, unpubl. data).

We reviewed a wide diversity of published and unpublished information to determine the status and distribution of plant and wildlife species in the Study Area and the Santa Monica Mountains as a whole. The most important sources of data are listed below, with brief summaries indicating the types and quantities of information obtained from each one.

- Records of special-status species in the Study Area from the California Natural Diversity Data Base (2012, 2013). We found 33 special-status plant records involving 10 taxa; two special-status bird records; four special-status fish records; seven special-status mammal records; and 17 special-status herptile records. That relatively few records exist from the Study Area presumably relates to the scarcity of large projects requiring formal surveys likely to produce records for the database.

- Federal publications on the status of four federally-protected plants, Lyon's pentachaeta (*Pentachaeta lyonii*), Braunton's milkvetch (*Astragalus brauntonii*;), and two endemic subspecies of liveforever (*Dudleya cymosa* ssp.); and for two fish, southern steelhead (*Oncorhynchus mykiss irideus*;) and tidewater goby (*Eucyclogobius newberryi*) (National Oceanographic and Atmospheric Administration 2005, USFWS 2006, USFWS 2008, USFWS 2009a, USFWS 2009b). Occupied habitat for the fish species largely fall within public lands (though portions of Topanga Creek are within private

lands), whereas that for the plants, including unmapped populations, is more evenly divided between public and private lands.

- Recent published and unpublished survey information collected in the Santa Monica Mountains by NPS and other agencies, including data from the following activities:
    - Sampling native stream amphibians (four species) and non-native crayfish (*Procambarus clarkia*; K. Delaney, NPS, unpubl. data).
    - Studying the distribution and movements of southwestern pond turtle (*Emys marmorata*) (Dagit et al. 2006, Bell et al. 2011), southern steelhead (Dagit et al. 2003, 2005, 2009) and tidewater goby (Dagit and Williams 2005).
    - Pitfall trapping for reptiles and amphibians in the Santa Monica Mountains, though mainly at sites outside the Study Area (K. Delaney, NPS, unpubl. data).
    - Monitoring the movement patterns of mountain lions (*Felis concolor*) throughout the Santa Monica and Santa Susana Mountains using GPS-collared animals (S. Riley, NPS, unpubl. data).
    - Investigating the distribution of rare and uncommon plants throughout accessible portions of the range, mainly on public lands (T. Sagar, NPS, unpubl. data).

- Los Angeles County Breeding Bird Atlas (Los Angeles Audubon Society and Museum of Natural History, Los Angeles County, unpubl. data). During a survey effort conducted between 1995 and 1999, volunteers covered 13 survey blocks within four U.S. Geological Survey quadrangles, each covering approximately 6,600 acres, located entirely or partially within the Study Area. During the time of the survey effort, 95 native species (and seven non-natives) were considered to be at least "possibly breeding" in at least one block, with a total of 78 native species confirmed as breeding; an average of 62 species was confirmed breeding per block.

- Bird sighting records submitted to Cornell Lab of Ornithology's online ebird database (www.ebird.org). We found 84 records from the Study Area for 15 special-status bird species, most dating from 2003 to 2013; none had been entered into the CNDDB.

- Bird nest and egg records from the Western Foundation for Vertebrate Zoology. Out of more than 20 egg sets of nine "special-status" bird species attributed to the Santa Monica Mountains, only three sets were from the Study Area (all of Turkey Vultures *Cathartes aura*).

- Butterfly observations. Chris Nagano (USFWS) provided a spreadsheet of butterfly observations made in the Santa Monica Mountains during 1965 and 1966 by a local collector, Keith Hughes, including records of 40 species from seven sites in the Study Area. To date, this appears to be the only recorded source of butterfly information specific to the Study Area.

- Vertebrate specimen records from the Los Angeles County Museum of Natural History and other collections[3]. Searches of online databases yielded:

    - 393 records of special-status and stewardship herptile species from the Study Area, representing 20 species. Most records involved a handful of frequently-collected taxa, such as 100+ specimens of the California treefrog (*Pseudacris cadaverina*). Most specimen records date to the 1940s – 1960s.
    - 31 specimens of special-status and stewardship mammal species from the Study Area, representing 9 species; most specimen records are pre-1980.
    - No useful specimen records of special-status or stewardship birds (any possibly relevant records were from vague locations such as "Santa Monica Mountains" or "Malibu").
    - Ecological information from environmental impact reports prepared for previous projects in the Study Area (e.g., for Soka University). Typically, we found that these reports contained little original research or survey data relevant to our efforts, or that the information had been made available through another source, such as the California Natural Diversity Database.

- Plant records from the online databases Calflora (www.calflora.org) and Consortium of California Herbaria ("CCH"; www.ucjeps.berkeley.edu/consortium), as well as from the records of various local botanists. We also used locations given in local floras if they were specific enough (e.g., McAuley 1985). Excluding species known only from unattributed entries on checklists, we located 127 records of 21 "special-status" plant taxa in the Study Area in the database maintained by Calflora and CCH and from the unpublished notes of local botanists. In addition to these records, we used the same sources to find 167 records of 91 locally uncommon taxa not on the Special Plants list.

- National Park Service (NPS) archives. We made two visits to the NPS document archive, located at Mulholland Highway at Kanan Road. We reviewed various materials associated with the 1999 Resource Management Plan for the Santa Monica Mountains National Recreation Area (NPS 1999), much of which is within the Study Area, as well as unpublished information on Golden Eagles (*Aquila chrysaetos*) and other nesting raptors.

- Ongoing research conducted and coordinated by Cooper Ecological Monitoring, Inc., in the eastern Santa Monica Mountains (including Griffith Park) since 2007, including publications and reports on large mammals (Mathewson et al. 2008); birds and herptiles (Cooper, unpubl. data); butterflies (Bonebrake and Cooper unpubl. data); rare plants (Cooper 2012), and overall habitat management (Cooper and Mathewson 2009).

Tables of special-status species are provided in Appendix A.

[3] Note: Scientific collectors rarely sample a given mountain range or ecological community evenly, but typically collect only those species that they happen to be studying at the time, and as a result museum collections seldom reflect the true diversity of a given geographic area.

Interviews with Experts
Because so much natural history knowledge is anecdotal, we recognized early on the importance of tapping into the network of local experts to help fill in gaps in our knowledge of the Study Area. To this end, Cooper and Hamilton met with the following local experts and agency personnel to discuss our methods and findings, and to solicit published and unpublished information that would inform our project:

- Melanie Beck, NPS Outdoor Recreation Planner.
- Paul Edelman, Chief of Natural Resources and Planning, Mountains Recreation and Conservation Authority.
- Daryl Koutnik, Consulting Biologist, PCR Services Corporation (formerly with Los Angeles County Department of Regional Planning).
- Tarja Sagar, Botanist, Santa Monica Mountains National Recreation Area.
- John Tizler, Plant Ecologist, Santa Monica Mountains National Recreation Area.
- Carl Wishner, consulting botanist and author of "Flora of the Santa Monica Mountains: Synonomized Checklist and Index" (Wishner 1997).
- Marti Witter, NPS Fire Ecologist. Mediterranean Coast Network, National Park Service.

We solicited information by phone and email from several other agency and organization representatives, including Christina Danko (Former Planning Division Biologist, Ventura County Resources Management Agency, now with The Nature Conservancy), Jo Kitz (Former Associate Director, Mountains Restoration Trust), Suzanne Goode (Senior Resource Manager, California State Parks), Mark Abramson (Santa Monica Bay Restoration Foundation), Kimball Garrett (Collections Manager, Department of Ornithology, Museum of Natural History of Los Angeles County), and Barry Prigge (Collections Manager, UCLA Herbarium and coauthor of "A Naturalist's Flora of the Santa Monica Mountains and Simi Hills, California," Prigge and Gibson 20124).

Site Visits
Between June 4 and August 20, 2012, Cooper visited all accessible areas of each watershed of the Study Area, exclusive of public lands, to become familiar with the area's natural resources. Hamilton accompanied Cooper on some of these visits. Cooper kept notes on relevant plant and wildlife observations and took photographs during these visits, and entered many bird sightings into the Cornell Lab of Ornithology's online ebird database (www.ebird.org).

[4] Currently accessible here: http://www.smmflowers.org/bloom/bloom.htm

Vegetation Classification and Mapping

We obtained digital maps and acreage information for vegetation associations recently mapped by NPS in the entire Santa Monica Mountains (CDFG 2006, AIS/ESRI 2007). The mapping method involved identifying dominant species across homogeneous "stands", and determining the most abundant species frequently involved judgment calls by aerial photography interpreters. The minimum mapping unit was one acre, and personnel did not attempt to delineate stands smaller than this size.

Vegetation was mapped in a hierarchical manner, with Formation being the coarsest level, followed by Alliance, Association, and then Phase (among several other subcategories). Vegetation mapping units were defined at a very fine scale, such that approximately 270 categories, or "vegetation types", were mapped in the Santa Monica Mountains as a whole. Of these, 210 vegetation types were mapped within the Study Area[5]. In order to analyze these myriad categories in terms of ecosystem function, we first needed to condense the vegetation types into a manageable number of widely-recognized habitats. This process involved determining which vegetation types support similar assemblages of associated plants and animals. Although most grouping of vegetation types took place at the lower levels, such as Phase and Subassociation[6], in some cases consolidation extended up to the levels of Alliance and Formation.

At the same time, we recognize that even subtle distinctions between vegetation types can translate into their supporting very different plant and animal communities. An oak woodland with willow as a co-dominant, for example, should support birds found in oak woodlands as well as certain species found in riparian habitats (i.e., that are attracted to willows, regardless of whether the oaks are present).

Therefore, using our best judgment and consulting with various sources (e.g., McAuley 1996, Barbour et al. 2007) one of our first tasks was to group the 210 vegetative groupings in the Study Area into Ecological Communities[7] appropriate for this conservation analysis. We describe our decision-making process in greater detail in Appendix B.

We started by grouping the vegetative categories mapped by NPS into six main habitat types (Appendix C), based both on structure as well as each maintaining a distinct community of plants and animals in coastal southern California:

---

[5] According to J. Tiszler, NPS (in litt.), the 270 categories "would include a mix of associations, phases, 'mapping units' (aggregations used when PI [photo interpreters] could not differentiate associations/alliances), and polygons only mapped to alliance level. Mapping at these different levels of organization results from limitations on PI capability to differentiate to the same hierarchical level at all locations for all types.

[6] For example, the "Laurel Sumac-Ashy Buckwheat" Association (1,723 acres) was mapped separately from both the "Laurel Sumac-Ashy Buckwheat-Black Sage Phase" (379 acres) and the "Laurel Sumac-Ashy Buckwheat-Deerweed Phase" (743 acres). Of course, these last two divisions would also be temporally variable; for example, deerweed (*Acmispon glaber*) is an early-successional species that would probably be reduced in extent over time, perhaps being overtaken by black sage (*Salvia mellifera*). Either way, there would be little consistent difference in the associated plants and animals in each one.

[7] The use of natural communities to define habitat is not new; for years ecologists relied on the "Holland Classification" (Holland 1986) of California natural communities to define habitats, which has been largely replaced by more fine-grained, dominant-species-based divisions more akin to the 200+ "vegetation types" mapped for the Santa Monica Mountains.

1. Riparian, dominated by willow (*Salix*), western sycamore (*Platanus racemosa*), mulefat (*Baccharis salicifolica*), or another riparian-associated tree or shrub[8].

2. Scrub (all non-riparian types, including chaparral and coastal sage scrub)[9]

3. Woodland (non-riparian; tree species dominant).

4. Grassland, with native or non-native grasses dominant and lacking shrubs and trees as dominants (see description below).

5. Rock outcrop, characterized by bare rock or with spikemoss (*Selaginella*) dominant.

6. Artificial Pond/Open Water

We then evaluated the ecological functions of these major habitat types in the Study Area and created additional subdivisions based upon our knowledge of these functions, as described subsequently.

[8] Wetlands, particularly natural ones, are rare within the Study Area, and very little acreage was mapped. We anticipate that most wetlands will be found during site-specific surveys, and that these will generally be considered ESHA.

[9] We acknowledge substantial ecological differences in chaparral vs. coastal sage scrub, and the fact that boundaries can remain constant over time. However, due to the wide overlap of wildlife and many plant species in each within the Santa Monica Mountains Coastal Zone, and the lack of listed or otherwise highly sensitive wildlife species closely associated with coastal sage scrub elsewhere in the region, such as the Coastal California Gnatcatcher (*Polioptila californica californica*), we treat them as a single habitat type here. Often, coastal sage scrub along ridges and valley floors will alternate in a mosaic with chaparral on slopes, with free movement of wildlife in between each area. By contrast, we separate riparian woodland from non-riparian due to marked differences in the wildlife and forb communities of each.

Table 1 summarizes the extent of each habitat type in the Study Area, based on recently mapped vegetation types.

Table 1. Major Habitat Types in Undeveloped Portions of the Study Area.

Habitat Type	Acres
Scrub (includes chaparral and coastal scrub)	38,205
Woodland (and savannah; excludes riparian)	4,902
Riparian	1,493
Grasslands (includes native and non-native)	1,070
Rock Outcrop	372
TOTAL	46,042[10]

The gross totals provided above help to establish the Study Area's baseline ecological setting. The implications of vegetation classification and mapping for the designation of ESHA are analyzed later in this report.

Additional to these major habitat types in the Study Area are various "micro-habitats" – small, discrete natural communities that cannot be mapped at the one-acre scale but that nonetheless contribute greatly to an area's biodiversity, both because of their constituent species as well as the roles they play in the wider ecosystem. For example, seeps and springs provide scarce water in an arid environment and often support rare plants, amphibians, and other natural elements of limited distribution. Additional discussion of micro-habitats is provided subsequently.

Riparian

Any community mapped (by NPS) as being dominated/co-dominated by willow (*Salix*), western sycamore (*Platanus racemosa*), or mulefat (*Baccharis salicifolia*) was coded as Riparian. We also coded "rocky stream" as Riparian. Because many riparian features and species, such as distinctive herbs, exist on the landscape below the minimum level of mapping, the full extent of this habitat has not been mapped. Even riparian species that are widespread and dominant in other parts of southern California, such as cottonwoods (*Populus* spp.), are too scarce in the Santa Monicas to have been mapped. However, such

[10] Note: these numbers are less precise than indicated, and only represent the best effort of photo-interpreters in a narrow window of time (early-mid-2000s). J. Tiszler (NPS, in litt.) recommends rounding to the nearest 50 acres as a rule for these largest divisions.

areas should still be considered riparian habitat where they occur. Therefore, it is incumbent upon biologists conducting surveys for individual proposed projects to be able to recognize these features and make recommendations for their conservation as appropriate. Open water was typically not considered Riparian habitat, nor was cattail marsh, as both are anthropomorphic habitats in the study area, largely restricted to artificial ponds on a single golf course. While we acknowledge these require special consideration under CEQA, they would not typically be recognized as ESHA (because, for example, these artificial habitat areas must be regularly disturbed as part of normal golf course operations and maintenance).

Certain chaparral and woodland plants such as blue elderberry (*Sambucus nigra* ssp. *caerulea*) and giant wildrye (*Elymus condensatus*) often occur in riparian areas, and are used by riparian-associated wildlife species, but we did not classify as Riparian all habitats dominated by these plants, given their wide tolerance for non-riparian conditions and the fact that they do not support anything close to a full complement of riparian wildlife species when they occur outside of riparian settings.

Woodland

Any community dominated by a tree-forming oak (*Quercus agrifolia, Q. lobata, or Q. wislizenii*), walnut (*Juglans californica*) or California bay (*Umbellularia californica*) was classified as Native Woodland. The ecological justification for this grouping is that woodlands dominated by these trees tend to support very similar animal communities across the Study Area, and both bay and walnut trees frequently co-occur with oaks in the Santa Monica Mountains and other Transverse Ranges. Stands of non-native trees (including planted pines *Pinus* spp.) were treated as Urban habitats.

Los Angeles County is currently revising its standards on defining and protecting oak woodland, in which it follows State law in defining oaks as trees greater than 5" DBH, and "oak woodland" as having a greater than 10% canopy cover.[11] This would seem to be applicable to all native woodland in the study area, though we should note that not all oak woodland was mapped (by NPS); areas with sparse oaks were frequently mapped as comprised of whatever dominant vegetation was at a particular site (often chaparral). We would support re-analyzing the mapping data to detect areas with lower oak canopy cover than was used.

Areas of woodland that were mapped (by NPS) as having as a co-dominant a riparian tree or shrub (e.g., willow, sycamore, mulefat) were typically coded as Riparian habitat (see above), and secondarily coded as woodland. This was done to acknowledge that riparian communities support a distinctive group of wildlife species that are uniquely associated with specific tree/shrub species, regardless of structure, wherever they occur.

[11] Under Department of Fish and Game Code (Section 1360-1372), an oak woodland is an oak stand with greater than 10% canopy cover or that may have historically supported greater than 10% canopy cover. Under California state law, oaks greater than 5" diameter at breast height (DBH) are also protected (PRC 21083.4(a)).

Scrub

Aside from riparian scrub, which we include with Riparian habitats, we recognize six distinct ecological communities associated with scrub, described below. Two of these are best considered chaparral, as they are dominated by very large evergreen shrubs (such as toyon, *Heteromeles arbutifolia*), and four are generally included as variants of coastal sage scrub, which we define as lacking a large, evergreen shrub as a co-dominant. The first chaparral type, which we call Interior Chaparral, occurs mainly on inland ridges (e.g., Castro Peak) and at lower elevations north of the Study Area (e.g., in Agoura Hills), reaching the coast very locally. This form of chaparral often develops on gravelly soils, and is dominated by chamise (*Adenostema fasciculatum*), redshanks (*Adenostoma sparsifolium*), and several species of *Ceanothus* that have limited distributions in the Santa Monica Mountains. This form of chaparral often features openings of well-drained soil between the shrubs that supports numerous species of limited distribution, including Bell's Sparrow (*Artemisiospiza belli*), coast horned lizard (*Phrynosoma blainvillii*), and various rare annual plants. Any vegetation type with these shrubs listed as dominant/co-dominant were coded as Interior Chaparral.

The remaining chaparral types mapped (by NPS) in the Study Area (i.e., those with a large evergreen shrub as at least a co-dominant) are coded as "Coastal Chaparral" to distinguish them from Interior Chaparral. These lower-elevation types tend to occur on sandstone parent rock, rather than on volcanics or other well-drained substrates, and tend to be far more dense near the ground layer than Interior Chaparral, often lacking the bare patches between shrubs that characterize the local forms of Interior Chaparral. While a small number of special-status plant and wildlife species may occur within this habitat, sometimes for part of the year, these are typically wide-ranging or widespread species that are not limited to this habitat type. For example, with very few exceptions, special-status plant and wildlife species potentially present in Coastal Chaparral may also be found in Interior Chaparral, but the converse is not true: Interior Chaparral supports numerous distinctive species absent from other chaparral types in the Study Area. Thus, we do not define here a group of distinctive "Coastal Chaparral" species.

In addition, several mapped scrub associations are probably temporary, including post-fire associations (e.g., scrub dominated by bush poppy *Dendromecon rigida* or bush mallow *Malacothamnus fasciculatus*) that may soon develop into another chaparral or scrub type, and so were not included as distinct habitats in our analysis, but lumped with Coastal Chaparral. Two locally-dominant shrubs of Coastal Chaparral, bigpod ceanothus (*Ceanothus megacarpus*) and greenbark ceanothus (*C. spinosus*), have the Santa Monica Mountains as the center of their (global) ranges. While this is notable, the plant and animal communities associated with these types do not appear to be unique in any way; for example, no butterfly strictly requires either as its foodplant, and no bird species is known to occur more commonly in this type of chaparral than in another type (such as habitat dominated by chamise). It is also relevant that, as compared to other chaparral and scrub types, the communities we include in Coastal Chaparral are generally not associated with rare plants, as discussed below. Again this is not to say that this habitat type is somehow unimportant, or that it should be developed; rather it is merely to

acknowledge that there are differences among these types, which should inform conservation priorities (discussed below).

We recognized four main Coastal Scrub communities, including two main divisions based on the presence or absence of a perennial buckwheat (*Eriogonum*) as a dominant/co-dominant species ("Buckwheat Scrub" versus the more generic "Coastal Scrub"). We identified perennial buckwheat as important because of its "special role in the ecosystem" (a criterion in the designation of ESHA) in supporting a very wide variety of nectar-feeding butterflies that tend to use it preferentially, even when other blooming shrubs/forbs are present. These include several taxa thought to be in danger of extirpation in portions of the Santa Monica Mountains, such as the chalcedon checkerspot butterfly (*Euphydryas chalcedona*), which has already been lost from the eastern portion of the range (Bonebrake and Cooper unpubl. data). Buckwheat also occurs very frequently on loose, gravelly/sandy soil that is preferred by various reptiles that are Species of Special Concern, particularly such burrowing species as the coast patchnose snake (*Salvadora hexalepis virgultea*) and the coast horned lizard, a species that often partially buries itself in loose sandy soil.

Two buckwheat species occur as dominants in the Study Area, ashy buckwheat (*Eriogonum cinereum*) toward the coast, and the more widespread California buckwheat (*E. fasciculatum*). The Study Area (and coastal slopes in Malibu) includes a significant proportion of the global range of ashy buckwheat, and this species of buckwheat apparently serves as the sole foodplant for an unnamed population of square-spotted blue butterfly (*Euphilotes battoides*) (see www.socalbutterflies.org). To differentiate between the two types, one could call scrub with ashy buckwheat "Coastal Scrub-Ashy Buckwheat" and that with California buckwheat "Coastal Scrub-California Buckwheat". Finally, we should note that in cases where a chaparral (as opposed to a coastal scrub type) had either of two buckwheat species as a co-dominant, we considered it Buckwheat Scrub and thus listed as a form of Coastal Scrub, even though it might be roughly intermediate between a chaparral and a coastal scrub in structure.

We identified two other rare Coastal Scrub types: Alluvial Scrub, dominated by scalebroom (*Lepidospartum squamatum*), and Coastal Bluff Scrub, characterized (here) by either giant coreopsis (*Coreopsis gigantea*) or bush sunflower (*Encelia californica*), and often supporting a different mix of shrubs than coastal scrub located just inland. We included "beach sand" in with Coastal Bluff Scrub, since the two often co-occur. Bush sunflower may occur slightly inland in the Study Area, and we will examine these more inland occurrences to determine if they are appropriately coded as Coastal Bluff Scrub. We would also include Cactus Scrub in this list of rare Coastal Scrub types (it is dominant in Coastal Bluff Scrub to the west of the Study Area, in Ventura County, but none was mapped in the Study Area (i.e., no patches covering at least one acre were identified).

We coded the rest of the low deciduous scrub types simply "Coastal Scrub", including a great variety of types dominated by sagebrush, sages, and other species[12]. Since we could not identify a local animal community in the Study Area that was clearly associated with sagebrush- or sage-dominated coastal scrub (and that was not also present in buckwheat-dominated scrub), we did not differentiate between these scrub types. Clearly, Coastal Scrub varies considerably throughout the region, and supports very rare species elsewhere; several unique/rare animal species, most notably the Coastal California Gnatcatcher, are closely associated with California sagebrush (*Artemisia californica*) in other parts of the region, but these species are not known, nor have they ever been known, to occur in the Study Area, despite considerable fieldwork and specimen collection here[13].

Grassland

We treat mapped vegetation as Grassland only if (a) a grass were listed as a dominant/co-dominant, and (b) a tree or large shrub were not also listed as a dominant/co-dominant[14]. Thus, in calling certain habitat areas "grassland", we did not typically distinguish between native and non-native grassland, since most areas mapped as "grassland" have at least scattered natives mixed in. If a mapped chaparral or scrub type – of any kind – had a *native* grass as a co-dominant, it was also coded as Grassland to recognize the importance of this component in supporting grassland-dependent species, many of which occur in tiny patches of grassland within chaparral (or scrub). Examples of native-grassland-associated species locally include the California ringlet butterfly (*Coenonympha tullia california*) and several clay-dwelling wildflowers such as dwarf brodiaea (*Brodiaea terrestris* var. *kernensis*). From the NPS mapping, we found that at least three scrub communities are probably best included with Grassland, since they were mapped as being at least co-dominated by native grasses:

- Purple Sage–California Sagebrush-Ashy Buckwheat/Needlegrass.
- Native and Non-Native Herbaceous Superallliance Mapping Unit.
- Sawtooth Goldenbush/Purple Needlegrass–Clustered Tarplant.

[12] Many other scrub types exist in the study area than those dominated by buckwheat or by sages/sagebrush; however, they are generally not extensive enough to be mapped, and therefore are not treated explicitly here. They would all be discovered during site visits, and would be evaluated for significance during this process.

[13] Agency personnel have made the argument (to DSC) that coastal sage scrub in areas like the central and eastern Santa Monica Mountains should be preserved for California gnatcatcher since, although it does not occur here, it might in the future, perhaps with climate change, large wildfires, or loss of habitat through development elsewhere. We see little merit to this argument since there is no evidence that the species has ever occurred in the Santa Monica Mountains (although the its range has contracted in other areas of the region, such as along the Santa Clara River and Arroyo Seco in Pasadena). One could make the same argument for virtually any species that lives in a superficially similar habitat type elsewhere – that someday it *might* colonize that habitat in the Santa Monica Mountains – but this does not justify treating everything as potential habitat.

[14] The term "dominant" was one that was used by the NPS mapping effort; we prefer to use the term "significant", since that relies less on an arbitrary percentage of species, and more on the actual function of the habitat. Currently, Los Angeles County Department of Regional Planning (J. Decruyenaere, via email, Sept. 12, 2013) uses a 10% relative cover threshold of native species to qualify as "native grassland", which conforms to that for purple needle grass (*Nassella pulchra*) grassland as recognized by Sawyer et al. 2008.

However, pending more detailed mapping and site evaluation we don't classify as Grassland a handful of shrub-dominated associations that list "annual grass" or simply "grass" as a co-dominant[15]. For example, a landscape dominated by Laurel Sumac/Annual Grass-Herb is an association likely to be considered a form of Coastal Chaparral or Coastal Scrub, depending on the species present and the relative dominance of different elements. Acknowledging that such an association *could* also qualify as a type of Grassland, we believe that such associations are better treated as variants of Chaparral or as Coastal Scrub until more detailed investigation can be made. In particular, a site visit at the proper time of year is required to evaluate the presence or absence of native grasses and native forbs, which, if present, could re-assign them to Native Grassland habitat.

Finally, certain areas not mapped as Grassland were observed to have been cleared for some human use (fuel modification/firebreak, pasture land, agriculture, etc.), allowing grasses and sometimes native forbs to invade. Other areas were so dominated by non-native grasses and weeds that we saw no indication that native grasses or forbs were still present. For now, we have elected not to treat these as "Native Grassland" as defined above, but rather "Ruderal Grassland" pending site-specific, on-the-ground evaluations at the proper time of year that would determine the composition of the vegetation in question and presence/absence of a grassland- or forb-obligate wildlife (including invertebrate) community. For example, a fuel-modification zone around a house could develop into a band of non-native grasses providing habitat for a handful of grassland-associated wildlife species, such as the American kestrel (*Falco sparverius*) and California ringlet butterfly – species that may be otherwise scarce in a particular area. Whether this cleared zone would then be considered a "functioning grassland habitat" would depend on these and other species present, and a site-specific evaluation of the rarity, ecological function and overall significance of this particular habitat. Thus, we call grassland with significant native cover Native Grassland and that without significant native cover Ruderal Grassland. The determination of "significant" will be left to site-specific surveys, and cannot be determined from the range-wide mapping data.

Rock Outcrop

This community was identified where mapped as such, but also took in areas where spikemoss (*Selaginella* sp.) was listed as a co-dominant, since spikemoss tends to occur on outcrops or on very rocky soils. Rock outcrops are frequently associated with rare annuals and lichens. Outcrops in the Santa Monica Mountains derive from volcanic origins (mainly in the west and within the Zuma Creek watershed) or from

[15] These include types like Laurel Sumac/Annual Grass-Herb; in our experience in the region, these scrub associations are not typically associated with grassland-obligate species, nor would they in themselves be considered a "grassland community". For example, both Laurel Sumac/Annual Grass-Herb and Coyotebrush/Annual Grass-Herb are often fire-following communities that lack grassland-dependent wildlife and grassland-associated native annuals, due to the presence of large shrubs. Blue Elderberry/Giant Wildrye-Annual Grass-Herb is a community often associated with seeps and mesic slopes within Chaparral and Coastal Scrub that, again, tends to not support grassland-obligate plant or animal species, but rather supports scrubland ones.

sedimentary/sandstone origins (central ridge and Topanga). Both types support their own associated rare species, as described subsequently.

Seep/Spring

In the Study Area, seeps and springs are small, discrete communities with their own associated flora and fauna, including numerous specialized ferns, wildflowers, invertebrates, and amphibians (especially salamanders). Their component species differ according to the surrounding plant communities; for example, seeps in shady oak woodlands will support different species than seeps in arid chaparral. In light of the one-acre minimum polygon size, NPS did not map any seeps or springs in the Study Area. Project-specific site visits will be required to locate, map, and characterize these important habitats. While some of these habitats could be maintained or augmented by anthropogenic water sources, in general these treated here are fully natural features.

Artificial Pond/Open Water

This habitat type appears to be restricted to several small ponds within the golf course at the Malibu Country Club. Although clearly artificial, these ponds represent a distinct community that undoubtedly supports various native species. The ponds have potential support special-status species, but surveys would be required to make this determination.

Multiple Codes

Several vegetation types were considered to represent more than one coded habitat. In these cases, where judgment was required, we assigned these areas to the habitat type of greater biological sensitivity (i.e., the habitat type likely to receive the greatest protection). For example, an area that could be coded as either Native Woodland or Riparian habitat would be coded as the latter, as Riparian areas generally receive more comprehensive protection than do Native Woodlands. Other examples include:

- Giant Coreopsis–California Sagebrush–Ashy Buckwheat (Coastal Bluff Scrub).
- Purple Sage–California Sagebrush–Ashy Buckwheat/Needlegrass[16] (Native Grassland).
- California Sagebrush-California Buckwheat/Annual Grass-Herb (Native Grassland).
- Coast Live Oak/Chamise (Native Woodland).
- Bushy Spikemoss/California Buckwheat (Rock Outcrop).

Thus, the above-described analysis of vegetation types yielded the following list of 14 recognized "Ecological Communities" of the Study Area:

[16] NPS staff note: "If the needlegrass is *N. lepida*, the stand would likely be dominated by CSS species. If the needlegrass is *N. pulchra*, the stand is likely grassland with scattered CSS species. The former is on thin rocky soils and the latter on deeper clay soils. We generally see *lepida* and would have placed this type under CSS rather than grassland, but don't disagree with your choice." (J. Tiszler, in litt.).

1. Riparian
2. Native Woodland
3. Non-native Woodland
4. Alluvial Scrub
5. Coastal Bluff Scrub
6. Buckwheat Scrub
7. Coastal Scrub
8. Interior Chaparral
9. Coastal Chaparral
10. Native Grassland
11. Ruderal Grassland
12. Rock Outcrop
13. Seep/Spring[17]
14. Artificial Ponds/Open Water

For each of these Ecological Communities, we evaluated the extent to which they satisfied the Coastal Act's ESHA criteria, as described below. We worked with the County's GIS staff to produce maps showing the extent and distribution of each category, and then cross-checked these maps using aerial imagery from Google Earth Pro to make any corrections or additions that appeared necessary.

ESHA Determination

We analyzed the 14 Ecological Communities discussed in the previous section to determine which were "either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments" (i.e., the test for ESHA). For purposes of this discussion and ease of reading, we refer to the Ecological Communities as "habitat types" or "habitats," and their component mapped vegetation categories as "vegetation types". We constructed a table to summarize the specific reasons why each habitat type met or failed to meet each criteria of ESHA, including a description of our reasoning (see Appendix C), and provided a cross-walk describing how each vegetation type relates to our named Ecological Communities. This analysis not only helped identify ESHA, it also identified the various habitat types within the Study Area that may contribute strongly to biological diversity but that do not satisfy all ESHA criteria (see the discussion of Stewardship Habitats and Restoration Habitats below).

[17] Because Seep/Spring habitat was not mapped due to its small size, we did not identify any vegetation communities that were directly associated with it, but nonetheless retained it as its own Ecological Community.

As outlined below, we subjected each of the Ecological Communities to three main tests to reach conclusions about the areas that satisfy ESHA criteria.

ESHA Test 1: Evaluating "Rarity" in Habitat

Rarity involves the overall extent of each habitat type, within the Study Area and in larger contexts (e.g., regionally, globally). For example, grassland, rocky outcrops, and riparian habitats each represent less than five percent of the Study Area's undeveloped lands, suggesting that they are objectively "rare" within the Study Area. Woodlands dominated by oak (*Quercus*) and California bay (*Umbellularia californica*), at just over 10 percent of the mapped vegetation, would be considered rare by any measure. Coastal scrub, at just under 18 percent, is less rare (locally), at least in the aggregate (divisions of coastal scrub might be so considered, but not the vegetation type as a whole). Accounting for the vast majority of habitat in the Study Area, chaparral and coastal scrub together clearly would not be considered "rare" in the aggregate, although some of their subdivisions might be. However, they might be considered rare globally, since their species, common though they may be in California, certainly are not common globally.

The currently accepted ranking system for California vegetation is known as "MCV2" (Sawyer et al. 2008). This relies on NatureServe's Heritage Program methodology for assessing threat and rarity at the global and state level (see www.natureserve.org); however, it is less useful when attempting to define these characteristics at the local level, such as within coastal southern California, much less within the Santa Monica Mountains. These existing classifications is that they operate mainly at the "Association" level, which includes more than 200 vegetation divisions, rather than at more generally understood higher "community" levels of classification (e.g., oak woodland, willow scrub) used in earlier analyses (e.g., Holland 1986). We do not suggest that locally common, globally rare habitats are not "rare", or that they should be unprotected. Rather, we point out that there should exist a hierarchy when determining conservation priority, which could result in a habitat that is widespread at the state level but rare locally (e.g., annual grassland or rock outcrops rich in native forbs) receiving higher "rank" in terms of rarity, and therefore protection at the local level, than a plant community that is very common and secure locally, even if rare outside California (e.g., chaparral/coastal scrub), since by definition it is going to be less vulnerable to extirpation.

Evaluating both rarity (relative scarcity of the resource at a given scale) and sensitivity (relative threat level to the resource) is complex; each concept operates at multiple scales and may be highly situational depending on the amount of protected habitat in a given area. As an example, chaparral dominated by redshank (*Adenostoma sparsifolia*) may be considered (a) rare at the global scale, in that it occurs only from northern Baja California, Mexico, into central California; (b) widespread at the State level, as it covers tens of thousands of acres in the Coastal and Peninsular Ranges of the state; and (c) of local interest in the Santa Monica Mountains, where it occurs only as a patchy, relict population (see Weins et al. 2012) at the highest elevations or toward the dry interior slope of the range.

Continuing with this example, a further complication is that, in the Santa Monica Mountains, no highly sensitive species, nor unique plant or animal assemblage, is closely

associated with redshank chaparral alone. Within the Study Area, the collection of bird and butterfly species one would expect to find in a large tract of chaparral dominated by redshank, consisting of such widespread species as the Wrentit (*Chamaea fasciata*) and hedgerow hairstreak (*Satyrium saepium*), might be nearly identical to that expected in chaparral dominated by chamise or even *Ceanothus*. Redshank sprouts back readily after a fire, and the soil on which it grows is well-drained and gravelly, so chaparral dominated by redshank is rather resistant to invasion by non-native weeds. However, our analysis leads to a conclusion that redshank chaparral is somewhat unique and special because it is (a) definable and distinct as a community, at least in terms of its dominant species; (b) demonstrably rare in the Study Area, and (b) a relict of an earlier epoch in geological history, and occurring here at the edge of its range. But we find it problematic to conclude that redshank chaparral in the Study Area satisfies ESHA criteria because (a) it is not closely associated with any listed or otherwise highly sensitive species; (b) it does not, by itself, support a distinct or threatened assemblage of plants or wildlife; and (c) it does not appear to be immediately threatened by local impacts from development, weeds, or other major disturbances[18].

Given the mapping methods that NPS employed, which identified 210 vegetation divisions (Alliances, Associations, etc.) in the Study Area, it is unsurprising that we have found a number of other "subdivisions of subdivisions" that are sparsely distributed in the Study Area. A handful of these vegetation types were found to be more extensive on private lands than on public lands, but typically the areas involved are very small, and we did not identify any that appear to form a unique community (i.e., of other associated plants and animals) that would warrant treating them as a stand-alone Ecological Community worthy of conservation concern (as opposed to simply a locally-distinctive assortment of otherwise widespread plant species).

In the end, our conservation evaluations and analyses are based upon the known extent of and likely threat levels to various habitats based on both published and unpublished literature and informed by our 50 combined years of professional experience assessing habitats and observing and describing threats to these habitats in the Los Angeles area. We made every effort to attempt to determine rarity and threat level at the local level, while taking into account the regional and global distribution of various habitats. Striking this balance was essential in producing a hierarchy of rarity and threat, which was the purpose of this report.

ESHA Test 2: Evaluating Quality and Function of Habitat

Evaluating the quality and function of different habitat types in different parts of the Study Area is an essential component of the determination of ESHA and other classifications, as this tells us whether its resources are "especially valuable because of their special nature or role in an ecosystem." In general, an area identified as having

[18] To complicate matters, it appears possible that future effects, especially those associated with climate change, could eventually result in the local extinction of redshank from the Santa Monica Mountains (Weins et al. 2012). For this reason, we cannot argue that redshanks is not sensitive on any level, rather that it may not a) form a distinct Ecological Community, or b) rise to the level of sensitivity shown by other habitat types in the range.

habitat of high quality, however this is measured, will also have high function, as evidenced by the presence of robust populations of its characteristic species (see Johnson 2007 for a review of assessing habitat quality for birds). The NPS mapping informs us of where major habitat divisions lie (or did at the time of mapping), and we used this spatial information in conjunction with the other forms of data and analyses described herein to map those areas that do and do not satisfy ESHA criteria.

In general, the quality of habitat in a given area is determined by measuring the productivity and survivorship of one or more species of interest in that area over time. Information of this nature is difficult to obtain, especially across large areas, and may take many years in order to be considered reliable. Thus, ecologists typically evaluate the relative quality of the habitat in a given area of based on numerous observable factors, such as presence/absence of non-native weeds in the habitat and presence/absence of species typically found in high-quality habitat (i.e., "indicator species"). Since detailed, long-term demographic studies have not been conducted in the Study Area, the observed presence/absence of selected plant and wildlife species known to be especially sensitive to various forms of habitat degradation (e.g., fragmentation, invasion by non-native species, noise, artificial lighting) serves as an important proxy for hard data defining habitat quality and habitat function. The species most sensitive to habitat degradation tend to be those listed as Threatened or Endangered, but a species need not be granted any form of "special status" to be recognized as fulfilling a "special nature or role in the ecosystem". Such species may be of local interest or characteristic of/limited to a given habitat or region.

Conversely, the presence of invasive exotic plants as a dominant component of a given patch of habitat, or evidence of recent clearing of understory plants for fuel modification, or the presence of other forms of existing development within a given area, generally serves as an indication that the habitat in that area has already experienced degradation. Depending on the severity of the degradation, and possible legal requirements for ongoing disturbance (e.g., for fuel modification), an area of habitat that surely would have satisfied ESHA criteria in its original state may no longer qualify (see the subsequent discussion of Restoration Habitat).

As we describe here, our inferences are grounded in the large volume of baseline information we reviewed and analyzed. We have confidence that our delineation of ESHA will be validated in the great majority of cases, but it was outside the scope of our study to ground-truth the entire Study Area, and many privately owned areas are inaccessible. Furthermore, habitat quality, and even habitat type, may well change over time. Vegetation mapped as being disturbed (e.g., by fire or brush clearing) may strongly recover after a few years. An area mapped as being relatively pristine may be found years later to be highly degraded, and may bear little resemblance to its former identity. The only way to evaluate our inferences about habitat quality and function will be through site-specific evaluations by trained biologists following detailed survey guidelines (see Appendix D), with review by the County biologist and the existing Environmental Review Board for the Santa Monica Mountains (ERB).

Thus, applicants will have the opportunity to "prove in" or "prove out" of the ESHA designations identified in this report. In the case of large, complex sites with difficult-to-access areas, or with the potential occurrence of ephemeral species (such as rare wildflowers), multiple visits scheduled at particular times of year may be needed to evaluate habitat quality and function. We do not anticipate that it will be commonplace for applicants to "prove out" of ESHA, but in cases where a mapping mistake can be demonstrated, or where the quality/function of the habitat is shown to be far below the levels associated with ESHA, the LCP will provide a mechanism for doing so. We expect that "proving in" will be similarly rare, but the findings of site-specific biological surveys – such as the discovery of a new population of a listed species – could result in the designation of ESHA beyond the boundaries delineated in this report.

ESHA Test 3: Evaluating Ease of Disturbance in Habitat

The question of whether a given habitat type "could be easily disturbed or degraded by human activities and developments" is a potential source of debate, and no objective criteria exist for determining what is meant by "easily". For example, does the increased frequency of wildfire that typically accompanies human activity and development in an area (Syphard et al. 2007, 2009) lead to a conclusion that all fire-prone habitat types, such as chaparral and coastal scrub, should therefore be considered "easily disturbed"? Would one person illegally clearing land with a bulldozer for a day satisfy this criterion? Affirmative answers to these questions would suggest that the "easily disturbed or degraded" requirement of ESHA has little value in practical application, as one may readily develop various hypothetical situations under which virtually any type of habitat could be considered "easily disturbed or degraded".

For this analysis, conducted in a rugged, largely natural landscape where nearly all new development consists of single-family homes, we suggest that evaluating the *scale* of disturbance that would substantially degrade a high-quality example of a certain habitat type represents a more useful and meaningful metric in determining ESHA than does attempting to subjectively gauge the "ease" with which that habitat area might be disturbed or degraded. We evaluated the relative susceptibility of each habitat type to anthropogenic disturbance and degradation at two scales: (1) small-scale/site disturbance effects, such as construction of a single home or brush clearance for fire control, measured at the level of an individual property, and (2) large-scale/regional effects, such as road-construction, often considered under the general label of "fragmentation".

We consider a given habitat type to be "easily disturbed" if a substantial proportion of the resource could be disturbed or degraded by normal, predictable actions in a given area – typically undertaken in accordance with applicable land-use regulations, but including such activities as creation of informal hiking or biking trails. In addition to construction and brush clearance activities, mentioned above, examples include landscaping, residential irrigation, tree-trimming, keeping pets and horses, and similar domestic activities, as well as small-scale agriculture (e.g., viticulture)[19]. If extraordinary,

[19] This standard brings in fire as a potential agent of "easy" disturbance, since many fires are ignited by mundane activities, such as landscapers doing yardwork. However, since fire is not only a form of disturbance but also a natural process that is required at some level for ecosystem health, we must also determine whether

unforeseeable, typically unpermitted action would be required to disturb or degrade a substantial proportion of a given habitat type in the Study Area, we conclude that this does not represent "easy" disturbance of the resource.

We consider the terms "disturbed or degraded" to refer to a substantial, measurable loss of ecological integrity across the entire occurrence of that habitat type, such as the local extirpation of one or more species, or the loss of a particular biological activity such as breeding/nesting. Habitats that tend to easily lose this ecological integrity when one area is slightly disturbed must be considered a higher priority for conservation and protection than those that do not. Obviously, any habitat type may be incrementally affected by various activities; we believe the intention of designating ESHA is to identify resources especially vulnerable to loss and degradation and to prevent this by affording these resources special protections above and beyond the normal protection of natural resources afforded under numerous local, state, and federal laws.

Obviously this is a subjective test; too little research exists for our local habitat types to use a quantitative metric in classifying vegetation communities as easy to disturb or hard to disturb. However, these factors must be considered when evaluating proposed disturbance in the region. For example, one can remove multiple acres of the most abundant chaparral types in the Santa Monica Mountains (e.g., big-pod ceanothus chaparral) and not appreciably degrade the integrity of the overall chaparral community in the area[20], since it is (a) so extensive, (b) rarely supports unique occurrences of plants and animals, and (c) resists non-native plant species invasion relatively well. Of course, not all chaparral is equal in this regard; there are numerous chaparral subtypes rich in microhabitats that would be easy to permanently degrade.

There are also areas of chaparral – their exact locations yet to be determined – that lie in areas likely serving as key wildlife movement corridors. These would obviously be a higher priority for conservation; more detailed assessments must be made through site-specific surveys including field visits, and more time spent analyzing mapping. Whether these would constitute ESHA simply because of their geographical location (e.g., serving as a buffer between two developed areas) is best determined by existing regulatory mechanisms such as the County's Environmental Review Board (ERB).

We also acknowledge that some habitats exhibit great sensitivity at a fine scale that would not show up on maps. For example, nearly all rock outcrops can be very easily and permanently disturbed by foot or bike traffic from a poorly sited trail or from fuel modification activities associated with a nearby residence, and only the largest ones were mapped by NPS. However, disturbance at one particular outcrop, near a major road for instance, can have very little effect on another one on the other side of a ridge, away from the road.

---

the anticipated increase in fire frequency related to normal human activity is likely to result in substantial degradation of a given resource.

[20] Existing County regulations (e.g., a maximum 10,000 s.f. limit construction footprint, fuel modification guidelines requiring thinning rather than clearing) effectively prohibit clearing or grading of large areas of any habitat native vegetation anywhere in the Study Area.

Other habitats may be disturbed at larger scales, or at both large and small scales. Ruderal grassland may cover large, contiguous areas and provide habitat for various wildlife species, including certain raptors, that require open country and yet are not sensitive to the invasion of non-native grasses and forbs occupying the entire habitat. Other patches of non-native grassland within extensive chaparral may provide critical microhabitats for butterflies and rare forbs, and the loss of one of these "random" patches may eliminate multiple species across a large area.

Finally, we note that the designation of ESHA represents an incomplete means of mitigating adverse regional effects associated with such large-scale phenomena as climate change, fire and drought, or air and water pollution. Nor is it intended to take the place of large-scale land conservation and parkland acquisition. Effective management of ecological communities across a landscape as expansive as the Study Area requires a suite of overlapping and complementary protections, including additional County ordinances (limits on house size, guidelines for brush clearance, etc.), as well as State and federal regulations. We assert that the intended role of ESHA was never to provide habitat continuity across vast landscapes, but rather to identify discrete, often small but extremely important areas that might not be otherwise effectively conserved through normal land use decisions.

ESHA Test 4: Presence of Special-Status Species

While we have made every effort to map and predict the locations of rare species and habitats, site visits conducted as part of biological assessments will, from time to time, undoubtedly reveal the presence of an individual or even a significant population of special-status plant or animal away from areas designated here as ESHA. Following the guide of the Malibu Local Coastal Program (Quality Code Publishing 2012), which covers similar lands directly adjacent to our Study Area, ESHA may include any habitat area that:

- Contributes to the viability of plant or animal species that are designated or are candidates for listing as rare, threatened, or endangered under State or Federal law;

- Contributes to the viability of species that are designated "fully protected" or "species of special concern" under State law or regulations; or

- Contributes to the viability of species for which there is other compelling evidence of rarity, for example plant species eligible for state listing as demonstrated by their designation as "1b" (Rare or endangered in California and elsewhere) or designation as "2" (rare, threatened or endangered in California but more common elsewhere) by the California Native Plant Society.

In addition, the Malibu LCP considers "any designated Area of Special Biological Significance, or Marine Protected Area" to qualify as ESHA.

Based on our research, we retain the first category ("Contributes to the viability of plant or animal species that are designated or are candidates for listing as rare, threatened, or endangered under State or Federal law"), but amend the final two to apply to any habitat

area that can be shown to contribute to the viability of species for which there is *any* "compelling evidence of rarity". For example, this could refer to a Species of Special Concern or to a CNPS Rank 4 plant that is demonstrably rare in the Study Area. We add to the list of "ESHA triggers" any species that are (a) locally-rare (but not necessarily "officially" given special-status), and (b) known to occur exclusively on private lands in the Study Area, based on information provided by local experts. We also include any species believed extirpated from the Study Area as potentially qualifying a habitat area as ESHA (see Table A7). Together, these additional species are:

- Demonstrably rare and/or threatened at either the local or regional level;
- Poorly-represented on public parkland in the Study Area;
- Unlikely to be protected by designation of ESHA alone (i.e., have distributions that are idiosyncratic, or restricted to microhabitats); or
- Potentially occurring on private lands in the Study Area.

Many of these species, if found, would occur in habitats that would be considered (and mapped) as ESHA anyway (e.g., riparian corridors, rock outcrops). However, we acknowledge the possibility that one or more plant or wildlife populations worthy of the highest level of protection could "slip through the cracks" of our analysis. Again, we stress that the possibility of their being present – and detected – anywhere in the Study Area (where not already known) is remote.

We concur with treating any "designated Area of Special Biological Significance" as ESHA; such areas are very few, and include USFWS Critical Habitat (discussed above; Marine Protected Areas do not apply to the Study Area).

While we acknowledge the importance and utility of statewide species lists, we believe that current information about the actual local status of species, where known, must be taken into consideration when evaluating a species' rarity and conservation needs in a planning document like this one. For example, we assert that the mere presence of any Species of Special Concern (such as the Yellow Warbler *Setophaga petechia*, which has become a common breeding species locally in recent years) should not automatically qualify a given habitat area as ESHA. Similarly, we would not include as "ESHA triggers" species that are simply too poorly known to science, such as the Santa Monica Mountains grasshopper (*Trimerotropis occidentiloides*) or Peninsular Ranges shoulderband snail (*Helminthoglypta traskii traskii*), until their range and ecology are better understood.

Defining Other Habitat Categories

As our analysis progressed, we identified many portions of the Study Area that do not meet the definition of ESHA but that nonetheless represent important threads in the ecological fabric of the Study Area and the wider Santa Monica Mountains. Such areas require effective conservation policies and planning, but not at the highest level reserved for ESHA. The two we identify are "Stewardship Habitats" and "Restoration Habitats".

Stewardship Habitats are habitat types or areas that are objectively (a) rare or especially valuable because of their special nature or role in an ecosystem, or (b) easily disturbed or degraded by human activities and developments, but that do not satisfy both of these ESHA-defining criteria. An example of Stewardship Habitat is Interior Chaparral, which supports certain special-status species but generally not those of the highest sensitivity, and which tends not to be easily disturbed or degraded by human activities and developments in the Study Area. Much of this habitat is current protected as parkland, including nearly all the known occurrences of the rare plants and animals that depend upon it.

Restoration Habitats are habitat types that are generally contiguous to ESHA, and that may largely function as ESHA, but that have been disturbed. An example would be riparian vegetation along a road through a canyon bottom, where the vegetation alternates between intact areas (where there are no structures) and those where the understory has been cleared around houses. Disturbance typically takes the form of periodic brush clearance for fire control. In most areas of Restoration Habitat, such as Monte Nido or Malibu Vista, the habitat may be retaining the function of ESHA, and may even support some of the rare species and processes protected by the neighboring ESHA, but due to current management its resources have been somewhat compromised. It is important to emphasize that we generally consider these areas to be functionally ESHA, but since one cannot say they are "easily disturbed" in their current state (being already disturbed, and in many cases with a requirement to continue with periodic disturbances), they would fail that portion of the test to determine ESHA.

For all other native habitat in the Study Area, we recommend using the term "Habitat – Other".

Buffers

In many parts of the Study Area, native habitat (intact or disturbed) adjacent to ESHA or other high-priority habitat may be afforded special treatment as a buffer zone. There may also be heightened conservation consideration given to land that borders National and State parkland, regardless of the resources it supports. The habitat types in the Study Area work in concert, sharing different species at different times of year, and providing cover for wide-ranging animals to move from one patch of habitat to another. Areas designated as ESHA, by definition, include the rarest and most sensitive habitats in the Study Area. To ensure that these special areas remain robustly integrated within the mosaic of habitats that make up the Santa Monica Mountains ecosystem, the prohibitions to development within ESHA must be complemented by well-considered regulation of development in areas that extend beyond ESHA boundaries. Only through this type of comprehensive planning can the overall ecosystem be expected to maintain a high level of vitality as future projects continue the processes of disturbance, habitat degradation, and fragmentation that started long ago and that will continue into the foreseeable future.

Our planning approach identifies two recommended levels of protection in the areas immediately surrounding ESHA: (1) a Buffer that extends 100 feet from the edge of ESHA, and (2) a "Quiet Zone" that extends 100 feet beyond the edge of the Buffer. Any proposed action in these areas must be evaluated for its potential to degrade ecological

values of the nearby ESHA. Those identified as having the greatest potential to degrade ESHA must be avoided; other proposed actions must be designed and conditioned so as to minimize adverse effects upon ESHA, to the extent feasible.

Some impacts associated with normal project operation and maintenance, such as brush-clearance, can be as loud and disruptive as the construction phase, and their adverse effects are often far-reaching and essentially permanent. Indirect or secondary impacts, as well as the cumulative effect of impacts that are insignificant on a case-by-case basis, may be just as detrimental. For example, brush cleared from a parcel far from a stream can result in a weed infestation that eventually reaches the streambed and then moves downstream, impacting habitat for miles. Maintaining a wide buffer around areas where such brush clearance is required effectively limits the spread of non-native species into the most easily-disturbed habitats, such as riparian areas and oak woodlands. An informal recent survey of upper Escondido Canyon during 2012 revealed that non-native periwinkle (*Vinca major*) was present in the creekbed at least 300 feet downstream of the last home site, and the highly-invasive leafy spurge (*Euphorbia terracina*) is now established in areas nearby where chaparral had been thinned recently (D. S. Cooper, pers. obs.). It is our experience that wider buffers around areas of disturbance more effectively limit the spread of non-native species into surrounding natural communities. Thus, wide buffers are more likely to protect the habitat values of ESHA by mitigating the impact of these and other effects of encroachment (e.g., noise, light).

We are aware of no scientific studies conducted in Mediterranean ecosystems to evaluate the relative conservation value of establishing buffers of different widths around sensitive habitat areas, or to determine the range and magnitude of effects that some common local land uses, such as hobby vineyard development, have on the local ecology. In place of peer-reviewed research, we refer to guidelines established by local resource agencies, such as the California Department of Fish and Game (CDFG), designed to limit the effects of human actions on nearby populations of native plants and wildlife, including nesting birds. We also reviewed what little information exists on known movements and home ranges of some of the sensitive species known to occur within ESHA and other sensitive habitats in the Study Area, including various bats, southwestern pond turtle (*Emys marmorata*), two-striped garter-snake (*Thamnophis hammondii*), and white-tailed kite (*Elanus leucurus*).

Standard CDFG guidelines require setbacks from construction noise and disturbance to be 300 feet for most nesting birds and 500 feet for raptors[21]. These distances are often

[21] "The project proponent should arrange for weekly bird surveys to detect any protected native birds in the habitat to be removed and any other such habitat within 300 feet of the construction work area (within 500 feet for raptors) as access to adjacent areas allows…if a protected native bird is found, the project proponent should delay all clearance/construction disturbance activities within 300 feet of suitable nesting habitat (within 500 feet for suitable raptor nesting habitat) until August 31…if an active nest is located, clearing and construction within 300 feet of the nest (within 500 feet for raptor nests) or as determined by a qualified biological monitor, must be postponed until the nest is vacated and juveniles have fledged and when there is no evidence of a second attempt at nesting. Limits of construction to avoid a nest should be established in the field with flagging and stakes or construction fencing marking the protected area 300 feet (or 500 feet) from the nest. Construction personnel should be instructed on the sensitivity of the area." (Construction guideline wording provided from Scott Harris, CDFG, 2010).

reduced upon review by local biologists (with permission from CDFG), and should therefore be considered maximum distances. However, when conducting nesting bird surveys on project sites, biologists are typically instructed to search for any nests up to 500 feet outside of work areas in order to reduce or eliminate the potential for disruptive human activities to inhibit birds from successfully nesting in nearby habitat. Many local ESHA types, including riparian and oak woodland, and rock outcrops, would be expected to support prime bird nesting habitat. Whereas many local bird species, including urban-adapted raptors such as Cooper's and red-tailed hawks (*Accipiter cooperii* and *Buteo jamaicensis*), may tolerate disturbance occurring much less than 300 feet away (these two often nests in backyard trees and urban parks), more sensitive species, such as the white-tailed kite, do not tolerate such encroachment. A cursory review of setback requirements of agencies for nesting kites in California varied from a minimum of 250 feet to a maximum of 1000 feet[22,23].

Research on the upland movements of southwestern pond turtles has documented that animals may spend an average of 111 days of the year (i.e., the dry season) in locations "an average of 50 meters from arroyos"[24]. Thus a 150-foot buffer might contain only half the aestivating pond turtles in a given area of the Santa Monica Mountains where the species occurs. Many other riparian-dependent animals, including Species of Special Concern, are known to make wide use of non-riparian habitat on a seasonal basis, and even within normal foraging trips. The two-striped garter-snake, essentially an aquatic species, occurs in coastal sage scrub and grassland habitat "in uplands adjacent to riparian areas", with home ranges that vary from 50 m^2 to "nearly 9,000 m^2", indicating considerable movement away from narrow riparian corridors[25]. Adult newts heading to breeding pools in late winter are thought to undertake "cross-country" trips of at least a kilometer[26]. Given the preference of this species for narrow canyons, such movements would inevitably traverse an array of habitats, most of them non-riparian (and, in our case, probably non-ESHA).

Certain bat species may require some of the largest buffers. For example, recent guidelines for the pallid bat (*Antrozous pallidus*) in northern California specify no disturbance within 300 feet of a maternity roost[27]. Resource agencies in Colorado recommend establishing a 10-km radius around summer roosts for the spotted bat (*Euderma maculatum*) in which logging is "limited" and fires are suppressed, and a 3.2-km radius where pesticides are not used "to avoid direct poisoning"[28] (with potential implications for local vineyard development). These and many other bat species are

---

[22] In Stanislaus County; http://www.stancounty.com/Planning/pl/actproj/ec/Wildcat%20Mines/3%20Appendix%20A%20Bio%20Report.pdf

[23] In Contra Costa County; http://www.co.contra-costa.ca.us/depart/cd/current/County/appendixg.pdf

[24] Rathbun, G. B., N. J. Scott, Jr., and T. G. Murphey. 2001. Terrestrial habitat use by pacific pond turtles in a Mediterranean climate. The Southwestern Naturalist 47(2):225-235.

[25] http://www.dfg.ca.gov/habcon/info/herp_ssc.pdf

[26] *Ibid*

[27] http://co.humboldt.ca.us/planning/forster-gill/docs/appendices/appendix%20e%20-%20biological%20studies/sensitive%20fauna%20report.pdf

[28] http://www.cnhp.colostate.edu/teams/zoology/cbwg/pdfs/USFW_spottedbat.pdf

known or likely to occur in the Study Area, although virtually nothing is known about specific roosting or breeding areas.

A report[29] prepared for stakeholders near Calleguas Creek, which flows along the western base of the Santa Monica Mountains in Ventura County, reviewed numerous studies and recommended a 200-foot buffer around areas of riparian habitat:

> The 100 foot buffer option may provide habitat for many terrestrial wildlife species, however, greater buffer width is needed for some species especially if there is limited adjacent upland habitat. However, depending on the buffer objective and land uses associated with the riparian buffer, smaller buffer widths may be appropriate to protect such functions as water quality improvements and sediment control, although smaller buffers may not justify protection of riparian habitats. The latter is best fulfilled through buffers no less than 200 feet.

Currently, few parts of the Study Area have "limited adjacent upland habitat", but certain accepted land use practices, such as brush clearing, render upland habitat unusable by certain species, including sensitive riparian species, at least temporarily until the habitat grows back (if it is allowed to do so).

Consistent with the City of Malibu LCP, the Draft LCP (2012) for the Study Area specifies a 100-foot Buffer around ESHA. As outlined previously, we recommend establishing not only a 100-foot Buffer but also a 100-foot Quiet Zone, in which only certain land uses would be permissible pending review by the County's Environment Review Board. This would increase the width of protected area substantially while providing flexibility for projects that are designed to be protective of nearby ESHA. We recognize that 200 feet may be insufficient to successfully contain all weed invasions, or to avoid disturbing all highly sensitive wildlife species, such as nesting kites and breeding bats. However, the provision of a 100-foot Quiet Zone will achieve a greater level of protection than is provided by a 100-foot Buffer by itself, and additional protections may be specified in detailed biological studies that would be prepared for individual projects under our recommended policy approach.

In addition to preserving ESHA throughout the Study Area, a wide Buffer/Quiet Zone serves the additional goal of better maintaining the mosaic of its interconnected habitats, while focusing on the areas of greatest ecological value. Many species of plants and wildlife occur in ecotones between habitats, such as along the grassy edge of a riparian corridor, or in scrubby openings between oak groves. A wide protective zone around riparian and oak habitats will better ensure the persistence of rare wildflowers that tend to occur in nearby microhabitats; for example, the highly restricted Ojai navarretia (*Navarretia ojaiensis*) appears to be an edge specialist that requires clay soils bordering oak groves (C. Wishner, pers. comm.; see below).

[29] http://www.calleguascreek.org/ccwmp/Riparian%20Buffers%20Final%20Study.pdf

Below: Microhabitat of Ojai navarretia, one of the rarest species known to occur in the Study Area, in upper Newton Canyon. In 2012, Cooper discovered a population of Ojai navarretia in the grassy opening shown here.

For the same reasons outlined above for ESHA Buffers, disruptive activities such as development and brush-clearance are often incompatible with maintaining an intact ecological community either within or near a given parcel. For this reason, we recommend affording special treatment and analysis to both Restoration Habitat and Stewardship Habitat, with the goal of maintaining as many of these higher-priority habitat areas intact as is legally and technically feasible. However, given that these habitats are designated as separate from ESHA in part due to their ecological resilience – including their relatively strong ability to resist invasion by non-native species – we are not recommending that buffers be established for these two habitat categories. Rather, we recommend that development be sited out of Stewardship Habitat where possible, and that brush-clearance (and other impactful activities) be limited to the least-disruptive methods, such as thinning vegetation using hand tools as opposed to using herbicides, goats, or discing, all of which spread non-native weeds.

In certain cases, such as on smaller parcels where the majority of the land is designated either ESHA or Stewardship Habitat, it may be impossible to avoid impacting Stewardship Habitat. In these cases, we recommend only that proposed projects be given added scrutiny to ensure that development proceeds in the least-disruptive fashion. Our

guidelines establish a hierarchy of how certain habitats should be prioritized relative to others, with ESHA and ESHA Buffer most critical to protect, followed by the Quiet Zone around ESHA Buffer, then Restoration Habitat and Stewardship Habitat; the remaining areas, designated "Habitat – Other", have the lowest conservation priority. In some cases, based on a site-specific analysis, the ERB or County Biologist may conclude that an area designated as Restoration Habitat is of highest value, and may recommend that development be sited in Stewardship Habitat instead. Such site-specific considerations are beyond the scope of our analysis, which has the goal of establishing an ecologically sound framework for prioritizing land-use decisions across the Study Area. In the relatively few cases where avoiding all impacts to ESHA and other higher priority habitat designations might result in the effective "taking" of private property, determination of how to proceed would be made through the County's established environmental review processes (including ERB).

RESULTS AND ANALYSIS

Patterns of Biodiversity in the Study Area

Biogeographically, the Santa Monica Mountains function both as a southern extension of the Coast Ranges and as a coastal spur of the Transverse Ranges; this is to say, they share most of their species and ecological communities with foothill areas to the north, west, and east (CDFG 2006). Unlike the Channel Islands just offshore, or the high, conifer-covered peaks of the nearby San Raphael and San Gabriel Mountains, the natural communities of the Santa Monica Mountains are most notable not for their intrinsic unique features (though some of these do exist), but for the diversity of southern California habitats compressed into a small area. In terms of plant and animal species, nearly all are found elsewhere in the state, though the range is notable for many relict stands and populations of more widespread Coast Range species, often fairly isolated from main populations (e.g., valley oak and Coast Range newt). Still, for a variety of reasons, the range is lacking many chaparral species found commonly at similar elevations just inland (e.g., Merriam's chipmunk *Tamias merriami*), and in the past century the isolation of the Santa Monicas from the rest of the state has clearly increased due to such anthropomorphic events as the construction of U.S. Route 101 and other barriers[30].

As discussed previously, the Coastal Zone in the Santa Monica LCP area is not particularly coastal; the far western and eastern edges reach down to the ocean at Leo Carrillo State Beach and Topanga Beach, respectively, and a small amount of coastal bluff scrub not within these two protected areas may be found on a sheer bluff along Pacific Coast Highway just east of Topanga Canyon Boulevard. According to the most comprehensive mapping effort of the Santa Monica Mountains to date (AIS/ESRI 2007), most of the land in the Study Area is located in what is termed the "Upper Elevation Zone" of the Santa Monica Mountains, which takes in the highest peaks of the range from

[30] This recent, anthropogenic isolation must not be conflated with evolutionary isolation, which produces high diversification; recent isolation may have the opposite effect, reducing diversity as the most common, often invasive species come to dominate a landscape, infiltrating the diverse niches once held by unique species. The central Santa Monica Mountains are characterized by relatively low evolutionary isolation (i.e., little differentiation for most taxa even at the subspecific level) and relatively high anthropogenic isolation.

Boney Ridge in eastern Ventura County east to Sepulveda Pass (both of which lie outside our Study Area; see Figure 3). Of the six other ecological regions that NPS identified, a narrow tongue of the "Lower Elevation Inland Zone" makes it into the Study Area in the vicinity of Malibu Creek State Park/Gillette Ranch, and the southern edge of the Study Area represents the upper portion of the "Immediate Coastal Zone". Four Regions are located wholly outside the Study Area: the "Western Fog Zone" (including Pt. Mugu State Park and the Conejo Grade), the "Inland Dry Zone" (most of the Conejo Valley, including Thousand Oaks), the "Simi Hills and Inland Zone" farther east, and the "Eastern Urban Zone", which extends from Pacific Palisades east to Griffith Park.

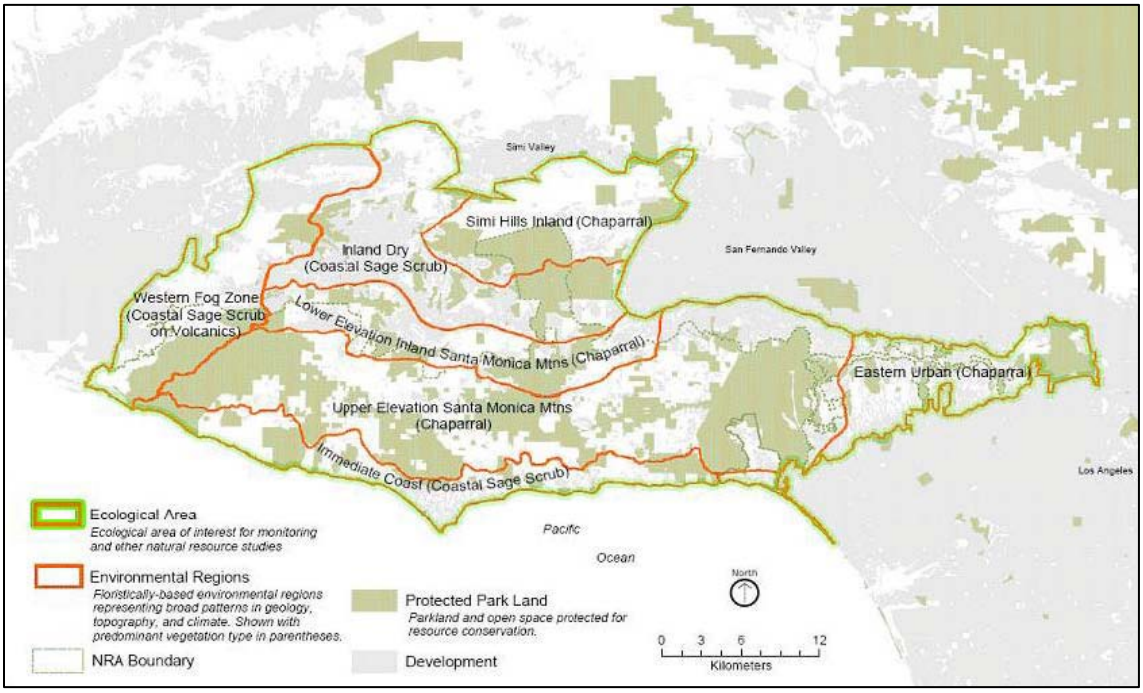


Figure 3. Ecological Zones of the Santa Monica Mountains (from AIS/ESRI 2007).

These zones present a useful representation of how the major ecological regions in the Santa Monica Mountains generally fit together and differ from each other. They are also reflective of the underlying geology of the range, which varies from rocks of volcanic origin to sedimentary shales and standstone, with often subtle changes in the plant communities. Many species of plant and animal widespread in the region occur within only one or two of these zones. This is particularly evident in the flora; a springtime drive down Potrero Road near Camarillo several miles inland (within the "Western Fog Zone") will pass giant coreopsis (*Coreopsis gigantea*) and coastal cholla (*Cylindropuntia prolifera*) typical of the Channel Islands amid the cactus scrub, yet just east of there, near Westlake Village, cactus patches along the same road occur under valley oak (*Quercus lobata*), a species typical of the hills surrounding California's Central Valley that finds suitable conditions in a dry interior valley of the Santa Monica Mountains.

Not surprisingly, the zonation of geology and vegetation across the entire Santa Monica Mountains is also reflected in the distribution of wildlife. For example, cactus scrub on Conejo Grade near Camarillo in Ventura County supports populations of the "coastal" Cactus Wren (*Campylorhynchus brunneicapillus*) and Coastal California Gnatcatcher (*Polioptila californica californica*), species absent from the rest of the Santa Monica Mountains, including the entire Los Angeles County portion. As is the case with coastal cholla, both bird species reappear to the south, on the Palos Verdes Peninsula, and their distributions extend from there south into Baja California. North of the Study Area certain bird species of the dry interior, such as the Western Kingbird (*Tyrannus verticalis*) and Lark Sparrow (*Chondestes grammacus*), are common in the oak savannah of the upper Malibu Creek drainage and farther inland, but are much less common as nesting species south of Mulholland Highway and toward the coast (including the entire Study Area). Less dramatic examples of these effects play out in the relative abundance of numerous species as one moves closer to or farther from the coast, or up or down in elevation in the range. Therefore, while the Study Area may be compared in some ways with the rest of the range, this must be done with caution given the heterogeneity described above.

Species Distribution Patterns in the Study Area

Special-status Species

Most of what we know about the status and distribution of special-status species in the Study Area is based upon investigations on publicly owned land. Public lands, almost entirely public parkland, account for more than half of the Study Area, and most of these areas have been acquired, and are still managed, with the conservation of biodiversity as a main goal. For example, most records of rare plants in the Study Area come from public lands, where, for the most part, their populations appear to be well protected. Most private parcels in the area prohibit access, and so their resources must either be inferred based on continuity of habitat from adjacent public lands, or discovered during a biological survey of a limited area conducted in preparation for a proposed project. Therefore, our knowledge of the distribution of special-status species on private lands in the Study Area is somewhat fragmentary. Nevertheless, a substantial body of research does exist for the resources of the entire Study Area, including private lands.

Overall, and despite its large size, the Study Area supports few species listed as Threatened or Endangered at the state or federal level (see Appendix A), and the few that are present tend to be relatively difficult to observe and study, or are highly localized to specific geographical areas, most of which are protected as public parkland or reserves. In part, this reflects the cryptic or specialized nature of the species; in large part, however, the paucity appears to be related to the Study Area being located almost entirely in only one of the seven ecological zones of the Santa Monica Mountains (see above), which means that this area encompasses only a fraction of the mountains' overall biological diversity. Thus, any localized plant species associated with unique microhabitats in the Santa Monica Mountains have, simply by virtue of geography, about a one in seven chance of occurring in the Study Area (assuming diversity were distributed evenly).

Our knowledge of rare plant and animal distribution is obviously incomplete, based on where biologists have been physically and legally able to explore, so is biased toward public lands, trails and roadsides. Still, based on what is known through decades of collection, surveys, and casual observation of many trained observers, it seems clear that other zones in the western Santa Monica Mountains – including the "Western Fog Zone", the "Immediate Coastal Zone", and even the "Simi Hills"– support more plant and particularly animal species considered rare at the State or global level than occur over the vast majority of the Upper Elevation Zone, where most of the Study Area is located; this is not to diminish the ecological importance of the zone, only to note that other Zones appear to contribute more to the conservation of rare species than does Los Angeles County's Coastal Zone. For example, some of the rarest plant species in California are tied to volcanic-derived soils of the far western Santa Monicas, and only barely reach the Study Area from the Ventura County side (if they do at all). Limestone seeps and calcareous soils of the Simi Hills, which support another suite of rare plants, are absent or nearly so from the Study Area. Coastal bluff scrub, coastal dune, salt marsh and coastal strand habitats, with their associated unique and rare flora and fauna, occupy a narrow strip along the coast, and therefore occur primarily within the City of Malibu (or in neighboring Ventura County) and only in small parts of the Study Area. Many special-status birds and certain mammals and herptiles rely on extensive lowland grassland and wetland areas such as those in the Simi Hills and Montclef Ridge areas to the north, so the near-total lack of these open, herbaceous habitats in the Study Area further reduces the chances of a given area supporting rare vertebrates, regardless of how pristine, or protected, the habitat is. Still, a number of important special-status species and notable habitats do occur (or have occurred) in the Study Area, and these are discussed in the following sections.

Birds

Only one special-status species, the White-tailed Kite (*Elanus leucurus*; California Fully-protected), was confirmed as nesting in the Study Area during fieldwork conducted for the Los Angeles County Breeding Bird Atlas. This raptor maintains a small resident population in the Santa Monica Mountains, including (at least into the 1990s) one or two nesting sites in the Study Area, both on public lands: Malibu Creek State Park; Trippet Ranch area of Topanga State Park (LACBBA, unpubl. data). Another special-status bird species, the Yellow Warbler (*Setophaga petechia*; California Species of Special Concern), widely colonized the Study Area at some point in the past decade, and is now a common breeder throughout the Malibu Creek drainage and in some adjacent watersheds. Today, the great majority of Yellow Warbler pairs probably occur on public lands in the Study Area (particularly within Malibu Creek State Park), although populations exist on private lands in the Topanga and Cold Creek drainages.

Three bird species that are widespread in the Study Area as breeders or winter residents – Cooper's Hawk (*Accipiter cooperii*), Merlin (*Falco columbarius*), and Southern California Rufous-crowned Sparrow (*Aimophila ruficeps canescens*) – are no longer considered to have special status in California, either due to recent population increases or because of improved understanding of their status and the nature of potential threats, and are now placed on the California Department of Fish and Game's "Watch List". A

fourth species on this Watch List, Bell's Sparrow (*Artemisiospiza belli*), is very rare in the Santa Monica Mountains, where it is confined year-round to high-elevation chamise chaparral, possibly only at the far western edge of the Study Area and into Ventura County (data from www.ebird.org).

Based on a recent effort to identify birds of concern in Los Angeles County that are not included in state or federal lists (Los Angeles County Sensitive Bird Species Working Group 2009), two bird species of local concern that are believed to nest in the Study Area are treated here as sensitive species: the Turkey Vulture (*Cathartes aura*) and Greater Roadrunner (*Geococcyx californianus*). And, although it is not placed on any of these lists, we recognize as a species of local concern what may be isolated, relictual population of Mountain Quail (*Oreortyx pictus*) possibly present in dense chaparral at the highest elevations of the Study Area and/or elsewhere in the Santa Monica Mountains (very few recent records). Several other special-status bird species included in Table A1 (Appendix A) are not believed to regularly occur in the Study Area, at least in the roles for which they have been granted special status (typically, as nesting species), but are included for completeness.

Mammals

Eight special-status mammals are known from the Study Area, the desert woodrat (*Neotoma lepida*), American badger (*Taxidea taxus*), and six species of bats (see Table A1; all California Species of Special Concern). Three species of mammals of the Study Area are not afforded special status at the State or federal level, but have declined in the region (or are known from only a handful of records), and are thus considered of "local interest": the ringtail (*Bassariscus astutus*), Pacific kangaroo rat (*Dipodomys agilis*), and spotted skunk (*Spilogale gracilis*). Incidentally, each of these species is believed extirpated from the eastern Santa Monica Mountains (Cooper and Mathewson 2009).

Herptiles and Fish

Eight special-status reptiles and amphibians are known from the Study Area including three snakes, two lizards, the southwestern pond turtle (*Emys marmorata*), and the Coast Range newt (*Taricha torosa*); see Table A1. A fourth snake species, the western yellow-bellied racer (*Coluber constrictor mormon*), has no special status, but it has declined over large areas of its range (including much of the Los Angeles Basin) and would be a strong candidate for local protection. The native freshwater fish fauna of southern California is characterized by very low species diversity yet high endemism (Swift et al. 1993). The larger streams within the Study Area, including Topanga Creek, Malibu Creek, and Arroyo Sequit, are known to currently (since 2000) support two or three special-status species: the southern steelhead (*Oncorhynchus mykiss irideus*), which occurs at least in the lowermost portions of these streams; the arroyo chub (*Gila orcuttii*), known from Malibu Creek and Topanga Creek (the latter since 2001, *fide* R. Dagit) and probably present in several others (Swift et al. 1993; M. Abramson, Santa Monica Bay Restoration Foundation, via email); and the tidewater goby (*Eucyclogobius newberryi*), known from lower Topanga Creek as well as lower Malibu Creek in the City of Malibu (U.S. Fish and Wildlife Service 2008). Southern steelhead had a much wider distribution in the Study

Area historically, likely occurring at least in Solstice and Zuma canyons, and possibly in others as well (reviewed by Dagit et al. 2005).

Invertebrates

Insects are, overall, the most poorly known organisms on the planet relative to their diversity, with only a handful of taxonomic groups (butterflies, dragonflies) well-known in terms of actual distribution and ecological requirements. In addition to the monarch (*Danaus plexippus*), which is known from the Study Area from an established winter roost site near Leo Carrillo State Park, five special-status insects have been collected in the Santa Monica Mountains region. Two of these are found on sandy beaches and dunes, and three would be expected in scrub and other habitats; virtually nothing is known about their current distribution or ecology. Additional potentially sensitive (but "unlisted") invertebrates occurring in or near the Study Area include several butterflies, most notably the Santa Monica Mountains hairstreak (*Satyrium auretorum fumosum*), apparently restricted to coast live oak (*Quercus agrifolia*) in the northwestern Santa Monica Mountains, north of the Study Area (Emmel and Mattoni 1989). In addition, several butterflies are known to have either declined or completely disappeared from the eastern, more urbanized Santa Monica Mountains (Bonebrake and Cooper unpubl. data) and yet still occur in the Study Area. As summarized by Magney (2010), several species of native gastropod (slugs and snails) occur, or potentially occur, in the Santa Monica Mountains. Some of these are placed on CDFG's Special Animals list, including the Peninsular Ranges shoulderband snail (*Helminthoglypta traskii traskii*), which is known from the Point Mugu area in Ventura County (and other sites in the southern California region) and likely occurs in the Study Area.

Extirpated Species

The current status of many sensitive species in the Santa Monica was poorly known even ten years ago; several of the species mentioned by Dixon (2003) as occurring in the Santa Monica Mountains are clearly extirpated, if not from the entire range, than from large areas of it, including the Study Area[31]. We found evidence for the extirpation of 13 vertebrate and invertebrate species and seven plant species from the Coastal Zone (Table A2a). One mammal, the San Diego black-tailed jackrabbit (*Lepus californicus bennettii*), may have occurred in the Santa Monica Mountains during the era of ranching (in the area now occupied by Malibu Creek State Park, for example), but this species is now very rare on the coastal slope of southern California and is presumed extirpated from the Study Area. The Golden Eagle (*Aquila chrysaetos*) apparently bred (or attempted to breed) on

[31] A 2003 Coastal Commission memo provided few details about the distribution of sensitive species in the range, and some of the information provided was mistaken. For example, the memo implied that the Santa Monica Mountains supports populations of Parry's spineflower (*Chorizanthe parryi* var. *parryi*), salt spring checkerbloom (*Sidalcea neomexicana*), Bank Swallow (*Riparia riparia*), Least Bell's Vireo (*Vireo bellii pusillus*), Cactus Wren (*Campylorhynchus brunneicapillus*), western spadefoot toad (*Spea hammondii*), and black-tailed jackrabbit (*Lepus californicus bennettii*), but populations of these species are unknown from the Study Area both historically and currently, and all are either extirpated from or extremely localized in the Santa Monicas at this time.

rock outcrops at Malibu Creek State Park from at least the 1970s until as late as 2005 (NPS archives; www.ebird.org), but was not confirmed as doing so during the Breeding Bird Atlas effort in the late 1990s; the species is now only a rare transient to the Study Area and is presumably extirpated as a breeder. The causes of its decline are unknown, but likely involve the elimination of ranching from the area (which resulted in a loss of food sources, typically stillborn calves and other carrion) as well as direct human encroachment from hikers and rock-climbers. Of the four known nesting sites in the 1980s (NPS archives), three are presumed inactive (Malibu Creek State Park, Lobo Canyon, Simi Peak); only Boney Ridge in Ventura County may still support this species (active nests remain in the San Raphael Mountains to the north).

Two owl species, the Long-eared Owl (*Asio otus*) and the Burrowing Owl (*Athene cunicularia*), were both known to breed in the Santa Monica Mountains north of the Coastal Zone (Calabasas, Chesebro Canyon), and likely occurred in the Study Area at the height of the ranching era, when the landscape was much more open. Two other species associated with open grassland and barren soil, the Loggerhead Shrike (*Lanius ludovicianus*) and Western Meadowlark (*Sturnella neglecta*), nested in the Santa Monicas at least into at least the 1960s and 1970s (WFVZ), but both have experienced steep local and regional declines and now occur only as non-breeding visitors in the Study Area, with the shrike occurring only in very low numbers. Both the Belted Kingfisher (*Megaceryle alcyon*) and Olive-sided Flycatcher (*Contopus cooperi*) were reported nesting at a small number of sites in the late 1900s, but neither is known from historical nesting records from the range; neither is believed to currently breed in the Santa Monica Mountains, if they ever did regularly (K. L. Garrett, pers. comm.).

The extirpation of Swainson's Thrush (*Catharus ustulatus*) as a nesting species, and the loss of the California red-sided garter snake (*Thamnophis sirtalis*), California red-legged frog (*Rana draytonii*), Pacific lamprey (*Entosphenus tridentatus*) and Quino checkerspot butterfly (*Euphydryas editha quino*), took place in the context of major regional declines for each, so the contribution of local land-use changes (i.e., those within the Santa Monica Mountains themselves) to their apparent disappearance from the Study Area may be minor.

Future extirpations are likely in the Study Area due to large-scale phenomena that may be largely unaffected by local or regional conservation and management actions. Even set-asides of very large blocks of habitat may not be enough to keep all extant plant and wildlife populations from declining or becoming extirpated. A recent study examining the decline of some of the most vulnerable species in the range, aquatic amphibians, concluded that a surprisingly low level of development within an entire watershed (8 percent) appeared to be a threshold for the absence of certain amphibians (Riley et al. 2005). However, it also concluded that major natural habitat variation among the study sites had a strong effect on species' presence in the area. Furthermore, many of the drainages in the Study Area still maintain a robust amphibian fauna (despite having more than 8 percent of their acreage developed) as compared with more urbanized drainages to the north, or with areas invaded by non-native aquatic species, such as Malibu Creek. However, amphibian diversity appears to be in global decline (e.g., McCallum 2007), and local trends should be closely monitored. Disturbingly, recent surveys for the

southwestern pond turtle (*Emys marmorata*) in drainages throughout the range in both 1989 and 2009 have documented its disappearance from nine of the 12 drainages in the intervening years, with the vast majority of the remaining population (hundreds of individuals) in Topanga Creek, one of the more developed watersheds in the Study Area, and dramatic population crashes within protected reserves (R. Dagit, RCD, unpubl. data). Clearly, more research is needed to accurately assess the actual threats to the biota of the region, to discover whether these declines are reversible, and to evaluate the effectiveness of existing conservation strategies.

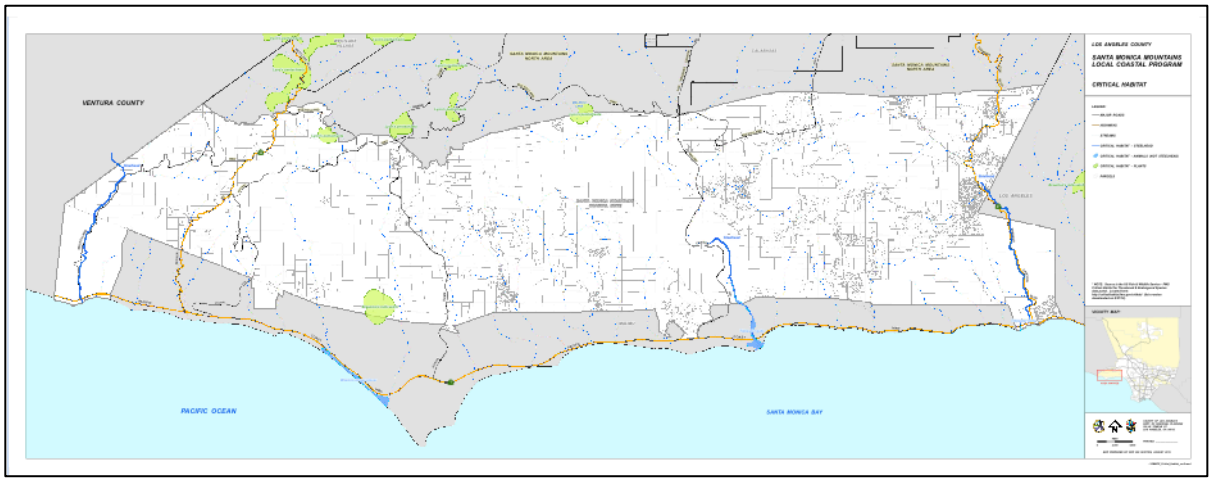
Plants

Compared to that of other groups, the distribution of plants is fairly well known in the Santa Monica Mountains, and several parts of the Study Area have long been favorite locales for collecting/botanizing, among them Malibu Creek State Park, Cold Creek and Topanga Canyon. Hundreds of plant species have been collected in these areas since the late 1800s (records now searchable online via Calflora), and the locations of dozens of locally-uncommon taxa have been maintained by National Park Service employees and volunteers in the past few years. From this dataset, we located records for 22 plant taxa that the California Native Plant Society (CNPS) ranks as either uncommon or rare in the State (Table A3) and for dozens of plant species considered uncommon by local NPS staff (Table A4).

Four of the 22 species of special-status plants known from the Coastal Zone are federally endangered or threatened: Braunton's milkvetch (*Astragalus brauntonii*) and Lyon's pentachaeta (*Pentachaeta lyonii*) (both federally endangered; the latter is also considered state endangered), and two subspecies of dudleya: the marescent dudleya (*Dudleya cymosa* ssp. *marescens*) and the Santa Monica Mountains dudleya (*Dudleya cymosa* ssp. *ovatifolia*), federally threatened. Critical Habitat has been identified and mapped for both the milkvetch and the pentachaeta (Figure 5) but these species are known from additional areas lacking this designation and it is likely that more populations await discovery. As is the case with many rare plants, the milkvetch and pentachaeta are associated with specific soil types rather than habitat or vegetation communities, with the former tied to calcareous sedimentary rock (calcium-rich, often white-appearing shale) and the latter largely restricted to volcanic soils. Both favor openings and areas with some disturbance (to form gaps in the shrubs), and the milkvetch apparently requires regular, rather heavy disturbance such as road-grading or fire, which encourages germination in future years. While the pentachaeta occurs sparingly east to Stunt Ranch and north of Castro Crest, the milkvetch is known from just two widely-scattered locations south of Castro Crest; either could be discovered on private lands with appropriate soils virtually anywhere in the Study Area.

The two *Dudleya* are both extremely range-restricted, found in a handful of canyon sites in the Study Area (Topanga Canyon, Malibu Canyon, and Trancas Canyon) and unlikely to be found much more widely or on land proposed for development (USFWS 2009a, USFWSb).

Figure 5. Critical Habitat for Lyon's pentachaeta and Braunton's milkvetch (pale green) and for southern steelhead and tidewater goby (dark and light blue) in Study Area (Study Area in white).



Among the remaining (non-listed) special-status plants treated in this report, some are known from just one or two locations in the Study Area (and are unlikely to be found in many more locations) whereas others are very widespread. For some of these species, the existing public lands probably either (a) support all or the majority of the few known occurrences in the Study Area (e.g., round-leaved filaree *California macrophylla*), or (b) support very large and presumably secure populations, even though the species may also be found on scattered private parcels (e.g., Plummer's mariposa lily *Calochortus plummerae*). The ranges of a few species, however, appear to coincide with areas still in private ownership in the Study Area, and may not be especially secure in existing parkland; these include western dichondra (*Dichondra occidentalis*), Ojai navarretia (*Navarretia ojaiensis*), Sonoran maiden fern (*Thelypteris puberula* var. *sonorensis*), and several locally-uncommon plant species (see Table A4).

Many special-status/locally-uncommon plant species appear not to be tied to a particular habitat (making their conservation challenging), but are associated with a specific feature that would not be readily apparent by analyzing existing vegetation maps (such as "sandy soil", which could occur in virtually any habitat, and as patches within a more dominant soil type). Still others are fire-followers (or "disturbance-followers") that are probably naturally rare for many years, than quickly appear and vanish when site conditions are ideal. Others appear to require such specific requirements that they would only be detected by careful surveys at particular times of year. For example, Blochman's dudleya (*Dudleya blochmaniae*) is described as occurring on "stony, open slopes, often in clay" (Raven and Thompson 1966), a seeming contradiction until one realizes that this refers to clay lenses formed through years of erosion on volcanic soils and shallow outcrops. Rock outcrops may be found within habitats ranging from non-native grassland to coastal scrub to oak woodland, rendering even 1-acre vegetation mapping useless in their detection. For these species, site-specific surveys – and regular updating of lists to reflect new information of occurrences – are essential to their detection and conservation.

Stewardship Species

As with the challenge of defining "easily disturbed", there exist no objective criteria that define what is meant by "special nature or role in an ecosystem". Arguably, any species, or even any occurrence, could be considered "special"; the Santa Monica Mountains, like every other ecosystem on earth, depends on its component parts working together. To say that oak trees are more "special" than walnuts, deer, ants or anything else belies a fundamental lack of understanding about the way ecosystems function. We simply lack the data to show that the removal of one component or another would be enough to irrevocably degrade the natural communities in the Study Area. Furthermore, this concept fails to acknowledge natural fluctuation and change in the environment, with natural turnover in species abundance and presence.

A more useful approach for conserving ecosystem functions across large areas would be to consider a suite of conspicuous, still-common species (to assist in their monitoring), that are either objectively wide-ranging across multiple habitats (i.e., generalists), or that are indicative of a specific habitat type or natural feature (i.e., specialists). We introduce the term "Stewardship Species" (Table A5) for a diverse collection of native wildlife species are not listed as having special status by any regulatory agency at any level (e.g., locally, regionally, Statewide or globally) and that may or may not be easily disturbed, but that are dependent upon the native ecosystem of the Study Area. Some may be considered "ecosystem architects", shaping the vegetation communities across large areas. For example, the mule deer (*Odocoileus hemionus*) forages on leaves of shrubs and trees in oak woodland, creating openings for wildflowers to thrive, which support a diversity of pollinators like native bees to visit these flowers and keep their populations robust. When deer are eliminated from the landscape, the native species richness of an ecosystem can become diminished and degraded, as has occurred in small, isolated patches of habitat throughout the Los Angeles area. However, deer are still abundant throughout open space over most of the Santa Monica Mountains, and are likely to remain so for the foreseeable future.

In addition to such wide-ranging species as mule deer, mountain lion (*Felis concolor*), and bobcat (*Lynx rufus*), Stewardship Species also include taxa that that may be regarded as indicators of the distinct ecosystem types in which they occur, such as Lawrence's Goldfinch (*Spinus lawrencei*), which is restricted to warmer inland valleys with savannah and arid chaparral, and the California treefrog (*Pseudacris cadaverina*), which favors steep, rocky canyons with year-round water. We do not find that populations of these species satisfy any defensible ESHA criteria at this point (pending some published or reported reference to their status); however, we still would like to call attention to these species because of what their presence or absence can tell us about ecosystem integrity, as they tend to be among the first to drop out of areas in ecological decline (the "canary in the coal mine" effect). It is only through proper stewardship of the landscape that populations of these species persist and thrive.

Through careful stewardship of the landscape in the Study Area and in adjacent areas, adverse effects of development may be effectively avoided and ameliorated, helping to ensure that the various Stewardship Species continue to maintain viable populations in

the Study Area. Several, such as the western gray squirrel (*Sciurus griseus*) and mountain lion, maintain somewhat isolated populations in the range. In some cases, as with the mountain lion, maintaining viable populations in the Study Area involves maintaining connections that effectively link the Santa Monica Mountains to the wider regional open space network. For a species like the western gray squirrel, which occurs in small, isolated populations susceptible to invasion and displacement by the eastern fox squirrel (*Sciurus niger*), effective conservation strategies will likely involve managers focusing attention on occupied habitat patches within the Study Area itself.

Thus, we generally conclude that several Stewardship Species do fulfill a "special nature or role in an ecosystem" in that they represent necessary cogs in the machinery of the natural landscape, helping to maintain the integrity and vitality of the ecosystem and supporting the variety of native habitats present. Their presence in a given area is not, however, sufficient to satisfy ESHA criteria, since (a) they are not rare at any level, and (b) we do not make a general finding that either their populations or their habitats "could be easily disturbed or degraded by human activities and developments."

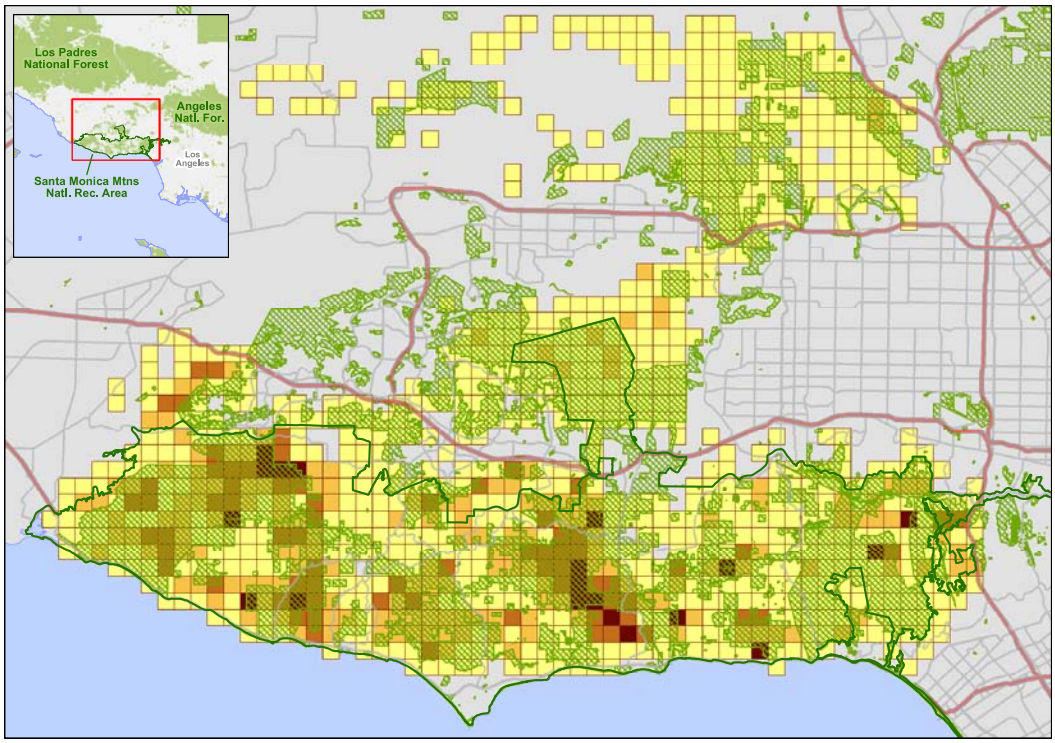
Wildlife Movement

Widespread assumptions that (a) large blocks of undisturbed habitat are intrinsically important to maintaining wildlife populations, and (b) the introduction of a house or a road necessarily diminishes an area's capacity to maintain healthy wildlife populations, are not always supported by evidence, much less site-specific evidence from an area like the Santa Monica Mountains (for all but a handful of species). Indeed, the debate over whether "single large" reserves are better than "several small" ones (sometimes shortened to "SLOSS") has been active for years, the conundrum with this debate being simply that both are needed, and that each is used differently. Obviously, there is a greater chance for a given species to maintain a larger population within a larger patch of habitat than a smaller one; but many rare species are so specific in their ecological requirements that their distributions do not always follow this pattern. When planning for wildlife passage, there are very few species that move on foot across large distances (typically just a handful of large and mid-sized mammals and a few birds) and their needs are imperfectly known. Some travel along brushy arroyos and riparian corridors, others follow exposed ridges, or roads, or simply follow narrow "game paths" that traverse hillsides. Documenting which particular areas in the landscape are critical wildlife corridors for one or more species (and thus may be considered ESHA, or another level of protection) is extremely difficult, and probably not possible in most cases, even through site visits.

Recent research into the movements of radio-collared mountain lions (S. Riley/D. Kamradt, National Park Service, unpubl. data) has revealed that the animals are extremely mobile within the entire mountain range, moving equally through public open space and private parcels rather than following narrow corridors of dedicated open space (Figure 6). Obvious "choke points" and documented freeway-crossing areas have been identified north of the Coastal Zone through this research, as along U.S. Route 101 in Calabasas, and the lions tend to stay outside of a one-kilometer band around dense urbanization (such as the southern edges of Calabasas and Westlake Village), but, as it stands, the current level of development appears be allowing for relatively free movement. Additional, poorly sited development within the range would not be better for the lions, and increased genetic isolation from other

animals due to the difficulty of freeway crossings could eventually cause the local lion population to become very small or even extirpated; but it is difficult to argue that development either at its current level or at the level proposed in the LCP is impinging upon, or will have the potential to impinge upon, their movement in and around open space reserves in the Study Areas, or that permitted development in the Study Area itself (as opposed to the dearth of connections to larger habitat areas well to the north) is having a negative impact on the local population

Figure 6. Mountain lion detections in Santa Monica Mountains and vicinity, 2002-2011 (courtesy of National Park Service).



DETERMINATION OF ESHA AND OTHER PROTECTED HABITATS

Previous versions of Los Angeles County's LCP for the Study Area proposed to classify all undeveloped land as one of four categories of Sensitive Environmental Resource Area (SERA), defined as "terrestrial or marine resources that, because of their characteristics and/or vulnerability, require special protection". The four categories that have been used are (1) Environmentally Sensitive Habitat Areas (ESHA), which receive the highest level of protection within SERA; (2) Significant Woodlands and Savannas, consisting primarily of undisturbed oak woodlands and savannas; (3) Significant Watersheds, which contain exceptional undisturbed habitats and/or are important in contributing to the

integrity of the regional ecological system; and (4) Watersheds, covering the remainder of the Study Area.

We propose revising the County's proposed SERA designations to recognize only the following three categories: (1) ESHA, (2) Stewardship Habitats, and (3) Restoration Habitats. Those portions of the Study Area falling outside of these categories (roughly corresponding to the current proposed designation of Watershed) would be subject to a range of LCP regulations and restrictions on disturbance and development, but would not be considered SERA simply by virtue of being located in the Study Area.

Delineation of ESHA

Pages 22-28 (above) discuss in detail the analytical framework we used to determining ESHA, per Section 30107.5 of the Coastal Act. In summary, areas that satisfy ESHA criteria:

1. Support generally intact, minimally disturbed habitat (per NPS mapping or our additional analysis); and

2. Are closely associated with the occurrence of special-status plant or wildlife species in the Study Area; and

3. Are easily disturbed/degraded, typically through effects associated with permitted or otherwise foreseeable actions at the scale of a single residence..

We determined that six Ecological Communities fully meet all ESHA criteria (see Table 2 and also Table A9 for a comparison of vegetation types found in each Ecological Community).

Most of the remaining habitat types were found to satisfy *at least one* criterion (see Tables A7a and A7b). Habitat types that partially met the criteria are discussed below (see "Stewardship Habitats" and "Restoration Habitats").

Table 2. Summary of Ecological Communities Delineated as ESHA in the Study Area[32].

Habitat Type	Acres
Alluvial Scrub	2
Coastal Bluff Scrub	N/A[33]
Native Grassland and Scrub with Native Grasses Co-dominant	1,000
Riparian	1,000

[32] Table does not include microhabitats associated with seeps and springs, which were not mapped, but would normally be considered ESHA.

[33] Total acreage will be determined by site-specific surveys, since most occurrences are too small to be mapped.

Habitat Type	Acres
Native Oak, Walnut and Bay Woodlands	5,000
Rock Outcrop	400

Note that portions of these habitats lie within designated fuel modification zones; the final acreages of ESHA has therefore been adjusted to roughly 6,000 acres, once the calculation of Restoration Habitat is made and these areas are removed from ESHA (described below).

Descriptions of ESHA Habitats

Alluvial Scrub

This distinctive, desert-like habitat type is mainly restricted to the lower portions of larger drainages of the Los Angeles Basin, but has been nearly eliminated by flood control efforts and development. A very small amount, mapped as "Scalebroom Alliance", occurs in lower Zuma Canyon, within the Zuma-Trancas Canyons open space area. While little is known about this specific occurrence, alluvial scrub habitat occurs on soil composed of fine gravel and sand along washes, which are strongly associated with burrowing reptiles and amphibians, as well as locally-rare and declining annual forbs. So, while this occurrence may not support a complete suite of alluvial scrub-associated species, it is distinctive enough, and rare enough, to warrant designation as ESHA.

Coastal Bluff Scrub

The two main occurrences of this community were mapped in the Study Area as scrub dominated by bush sunflower (*Encelia californica*) and giant coreopsis (*Coreopsis gigantea*). Coastal bluff scrub is a highly distinctive community containing near-succulent species, including localized forms of more widespread species (e.g., prostrate goldenbush *Isocoma menziesii* var. *sedoides*) confined to a narrow strip of land at the immediate coast. This habitat occurs at the western end of the Study Area (at Leo Carrillo State Park) and also at the eastern end (within Topanga State Park and on a strip of private land above Pacific Coast Highway just east of Topanga Canyon Boulevard); see Figure 9.

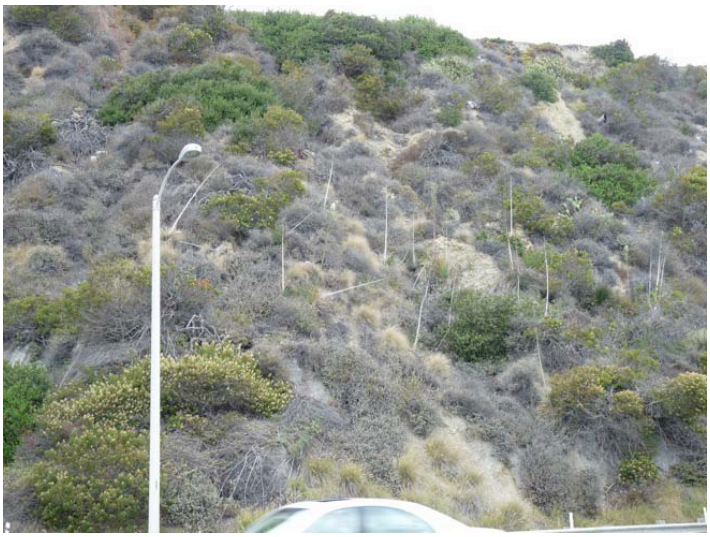


Figure 9. Recommended ESHA: Coastal Bluff Scrub, Pacific Coast Highway east of Topanga Canyon Boulevard.

Native Grassland (includes Scrub with Native Grasses Co-dominant)

Grasslands are very sparsely distributed across the Study Area, and grasslands with a strong native component are still rarer. Even within shrub-dominated vegetation, the dominance (greater than 10 percent by cover) of native perennial grasses in the understory is noteworthy. Mapping by NPS identified associations in which native needlegrass achieves sufficient cover to merit classification as a dominant or codominant constituent of vegetation. These alliances and associations are valuable in their own right, as they represent relatively intact examples of previously widespread native communities that are now replaced as a result of disturbance and subsequent invasion by non-native plants. Likewise these communities may support populations of special-status taxa, such as Catalina mariposa lily (*Calochortus catalinae*) and round-leaved filaree (*California macrophylla*). We also conclude that non-native grasslands satisfy ESHA criteria, since (a) many native forbs occur within non-native grassland, often seasonally (and so are difficult to detect most of the year), and (b) many special-status wildlife species (and stewardship species) are associated with non-native grassland and forb fields, including White-tailed Kite (*Elanus caeruleus*), yellow-bellied racer (*Coluber constrictor mormon*), and several butterflies (e.g., California ringlet *Coenonympha tullia*) (Figure 10).

Figure 10. Recommended ESHA: Scrub with Native Grassland, Puerco Canyon.

Riparian

Riparian habitats in the Coastal Zone are typically narrow and confined to canyon bottoms. They tend to be dominated by oaks, sycamores, and occasionally willows and mulefat. Numerous special-status species in the Study Area are wholly confined to and dependent on riparian habitats, including Yellow Warbler (*Setophaga petechia*), two-striped garter snake (*Thamnophis hammondii*), southwestern pond turtle (*Emys marmorata*), and Coast Range newt (*Taricha torosa*). Not all of these species are found in every type of riparian habitat; some prefer low-grade streams with willows adjacent to grassland, while others prefer alder and sycamore-dominated canyons. We consider to be ESHA all native riparian habitat areas, including those that are augmented or affected by anthropogenic influences.

Figure 11. Recommended ESHA: Riparian, Greenleaf Canyon, Topanga. Many such riparian areas may also be classified as "Native Woodland" (also generally ESHA).

Riparian habitats heavily infested with non-native plants, such as giant reed (*Arundo donax*), generally do not qualify as ESHA, in part because of diminished habitat function and value, and in part because such infestation indicates disturbed/degraded condition, which is incompatible with ESHA criteria. An example of riparian ESHA is shown in Figure 11.

Native Woodland

Several woodland communities qualify as ESHA due to their structural complexity and native food resource value. Their dominant plants often serve as "keystone species" that provide important resources for many wildlife species, such as acorns from oaks. Both the structure and food provided by these woodlands encourage high rates of use by wildlife by providing a diversity of shelter and foraging niches. Structural attributes include a greater diversity of vegetation layers, an abundance of hollows, cavities and crevices, a complex array of varied light levels and temperatures, as well as deep soils, leaf-litter, and longer-lasting coarse debris (limbs and fallen tree trunks), all of which provide a concomitant diversity of microhabitats for nesting, roosting and foraging. Food resources include acorns, walnuts and other fruits, as well as detritus in leaf litter and downed wood. Mature woodlands provide a rich resource base for an abundance of invertebrates, which in turn serve as prey for other animal species. Additionally, because valley oak reaches its southern limit of distribution in the Santa Monica Mountains, any

non-woodland vegetation types supporting this species would qualify as ESHA due to its regional biogeographic significance.

Oak woodlands are characterized by a distinctive faunal community comprised of species that are strongly dependent on oaks, including numerous birds (e.g., Oak Titmouse *Baeolophus inornatus*, Acorn Woodpecker *Melanerpes formicivorus*) and invertebrates (California sister *Adelpha californica*, valley oak ant *Proceratium californicum*). What may be one of the rarest animals in the Santa Monica Mountains, the recently-described Santa Monica Mountains hairstreak butterfly (*Satyrium auretorum fumosum*), is known to be strongly tied to oaks, though apparently only those in woodlands just north of the Study Area (additional surveys may yet turn up this species in the Coastal Zone however; aside from a handful of collection sites, virtually no fieldwork has been conducted to determine its actual range, *fide* T. Longcore).

The distribution of California bay (*Umbellularia californica*) corresponds very closely with that of oaks, such that the two often form a community (sometimes termed "mixed evergreen woodland", e.g., Holland 1986). Where this occurs, the associated flora and fauna of the two communities are also very similar, as they are with walnut woodland where this occurs near oaks.

Our analysis finds that all native woodland habitats in the Study Area conform to ESHA criteria, and we recommend that they be so designated. We conclude, however, that vegetation types dominated by scrub oak (*Quercus berberidifolia*) fail to satisfy ESHA criteria, since scrub oak tends to function more like a chaparral than a woodland. Scrub oak, as well as walnut "woodland", are often missing distinctive components found in oak or mixed evergreen woodland communities (notably, cavity-nesting birds). However, out of recognition that the black walnut is itself a special-status species, albeit one that is abundant and widespread in the Santa Monica Mountains (CNPS Rank 4.2), we find that this habitat marginally satisfies ESHA criteria.

Rock Outcrop

Rocklands within the Santa Monica Mountains support a distinctive flora, often dominated by spikemoss and liverworts. Lichens are numerous and diverse, with certain species largely confined to rock outcrops where they occur in the range (Knudsen 2007)[34]. These communities are slow to develop and slow to recover from disturbance, and therefore should be considered "easily disturbed" and warranting the highest level of protection.

In addition to the general characteristic of slow development, these areas often support rare or regionally-restricted taxa found in few parts of the Santa Monica Mountains, including Santa Susana tarplant (*Deinandra minthornii*), several species/ subspecies of liveforever (*Dudleya* spp.), Wright's buckwheat (*Eriogonum wrightii* var. *membranaceum*), silverleaf trefoil (*Lotus argophyllus*) and others.

[34] The lichen community of the Santa Monica Mountains contains 200-300 species and has been studied for more than 100 years and it is beyond the scope of this report to summarize this research. See summary here: http://www.mednscience.org/download_product/1246/0

Several rock outcrops in the Study Area are known support rare plant species and are susceptible to invasion by non-native weeds (which are discouraged by the thin, rocky soil).

In many ways, rock outcrops serve as refugia for various sensitive and localized native plants, including two onions (*Allium peninsulare*, *A. haematochiton*) and Plummer's mariposa lily (*Calochortus plummerae*). By extrapolation, numerous native invertebrates are probably similarly dependent on these habitats, though this community has been little-explored. In addition, several bird species with isolated breeding populations in the Santa Monica Mountains are associated with these outcrops, notably the Canyon Wren (*Catherpes mexicanus*).

Since the NPS mapping personnel included some large rock outcrops as part of the surrounding vegetation type, rather than mapping them separately, we have mapped several additional areas of rock outcrops through interpretation of aerial photos. These habitats satisfy ESHA criteria because these are rare and easily disturbed by human activities, and cannot be replaced or recreated. A typical view is shown in Figure 12.

Figure 12. Recommended ESHA: Sandstone outcrop in the Fernwood area of Topanga, habitat for both Santa Susanna tarplant (shown) and Plummer's mariposa lily. Note dark mat of spikemoss (*Selaginella*) at lower right.

Seep/Spring

Seeps and springs are critical natural features in that they provide consistent, often year-round surface water for a variety of plants and wildlife in what is an otherwise arid zone (springs typically feature flowing surface water year-round, while seeps may only have moist soil for most of the year). The microhabitats supported by these features include a diverse community of ferns, bryophytes, aquatic plants, and, often, rare annuals (including orchids) that depend on cool, moist micro-climates for their persistence in the Study Area (Figure 13). Wildlife depend on these features both directly (available drinking water, egg-laying sites for species such as western toad (*Bufo californicus*) and indirectly (summer/fall refugia for salamanders including *Ensatina eschsholtzii* and *Batrachoseps* spp.). Seeps and springs are also extremely easily disturbed, in that they are susceptible to alteration by non-native species, including sticky eupatory (*Ageratina*

adenophora), which can crowd out nearly all other plant species in a seep/spring environment.

Figure 13. Recommended ESHA: Seep/Spring near Topanga Canyon Road (also would be considered a rock outcrop).

Delineation and Description of Stewardship Habitat

For habitats that do not rise to the level of ESHA, we introduce a new term, Stewardship Habitats, to recognize these important elements in the Santa Monica Mountain ecosystem, and to emphasize the ongoing need for them to be considered in future conservation planning in the Santa Monica Mountains. Some habitat types are widespread and common in the Study Area, while others are more localized (but may be very common outside the Santa Monica Mountains). Stewardship Habitats may also provide important resources for species that are vulnerable at one of the lower levels of concern (e.g., California Species of Special Concern or CNPS Rank 4 plant species). Another characteristic of Stewardship Habitats is that they are not easily disturbed at a fine scale, such as the size of a single parcel (the assumption being that any large block of native vegetation could be "easily disturbed" by a landscape-scale disruption, such as from fire or the construction of a major road).

Today, each Stewardship Habitat is well represented on public parkland, and there is no indication that any of them will become rare or substantially disturbed in the near future (or else they would be strong candidates for classification as ESHA).

Sensitive species using Stewardship Habitats may be uncommon in the Santa Monica Mountains, but are widespread habitat generalists that simply occur in low densities across a variety of vegetation types. One example of a sensitive species that makes use of Stewardship Habitat in the Study Area is the coast horned lizard (*Phrynosoma blainvillii*) – which favors patches of sandy soil in virtually any scrub or open habitat, including riparian areas, chamise-covered slopes, and fire roads through grassland. Without years of intensive fieldwork, it is not possible to identify what might constitute key habitat for the coast horned lizard in the Study Area. Another example would be any of several uncommon butterflies associated with specific but widespread and abundant food sources, such as California buckwheat (*Eriogonum fasciculatum*), which are scattered across virtually the entire Study Area. While several special-status species occur in California buckwheat scrub, none appears to be especially dependent upon this habitat for survival – it is but one of a vast mosaic of habitats used by these species. Furthermore, it is also not particularly easily disturbed, as California buckwheat re-sprouts vigorously following brush-clearance, fire, and other types of disturbance. For this reason, buckwheat scrub is certainly an important habitat in the Study Area, but it does not satisfy all ESHA criteria. Of course, we readily acknowledge that Stewardship Habitats do support noteworthy processes, and may themselves be rare at some scale (e.g., buckwheat scrub is largely restricted to southern California); these facts distinguish them from other local vegetation types, but do not warrant their being called ESHA.

We identify two main Stewardship Habitats, Interior Chaparral and Buckwheat Scrub, as described below.

Interior Chaparral

Impact Sciences (2009) described what we term Interior Chaparral thus:

> "Several shrubland formations within the Draft LCP area associated with redshank and Eastwood manzanita merit protection for their noteworthy biological resources. Eastwood manzanita shrubland alliances are noted by NPS as being limited within the Santa Monica Mountains and are presumably relictual in the range, although it is more widespread in the higher mountains of the Transverse and Peninsular ranges of southern California. Stands of redshank (*Adenostoma sparsiflora*) are scattered in the Santa Monica Mountains, and when growing in pure stands or with hairyleaf ceanothus (*Ceanothus oliganthus*), represent unique associations thought not to exist outside of the Santa Monica Mountains."

While we recognize the isolated and relictual nature of this habitat type in the Santa Monica Mountains, including the Study Area, we do not find that it is particularly associated with special-status species here. Birds, butterflies, reptiles, and other groups found in this habitat occur widely in buckwheat scrub, chamise chaparral, and other Coastal Chaparral types where present on gravelly soils. In addition, we did not find that it was "easily-disturbed" by normal land use in the Santa Monica Mountains. Interior Chaparral typically occurs on very well-drained soils, which tend to resist invasion by non-native grasses and forbs (unlike, grassland, oak woodland, or riparian habitats, which are readily invaded by non-natives). Although it can be damaged or reduced in extent by too-frequent fire, it also requires a certain level of fire to germinate, and there is little evidence that its range has contracted recently in the Study Area. Most of the acreage of

Interior Chaparral in the Study Area occurs on public lands, much of it inaccessible (though a significant amount of redshank chaparral occurs on private lands, mainly in the vicinity of upper Arroyo Sequit/upper Decker Canyon Road). Granted, manzanita and redshank chaparral are both worth preserving as being botanical relicts that add to the overall diversity of habitats in the range, and for this reason and those stated above, this habitat type is best treated as Stewardship Habitat rather than as ESHA.

Figure 14. Recommended Stewardship Habitat: Interior Chaparral, Haasted Road (note redshanks).

Buckwheat Scrub

In the Study Area, buckwheat scrub takes two forms. One type, dominated by Ashy buckwheat (*Eriogonum cinereum*), is largely found along a coastal strip from eastern Santa Barbara County east and south through the Santa Monica Mountains to the Palos Verdes Peninsula in Los Angeles County. Thus, the center of its range appears to be within the Study Area. We have observed it inland to the area of Castro Crest, extending farther inland along Malibu and Topanga creeks where they bisect this high ridge. Ashy buckwheat scrub appears to be moderately resistant to invasion by non-natives (although pernicious weeds, such as fountain grass *Pennisetum setaceum*, have invaded locally, often in fuel-modification zones and on road-cuts). Occurrences elsewhere in the region, such as along the Camarillo Grade/Montclef Ridge of Ventura County and on the Palos Verdes Peninsula, support several special-status species, notably the Coastal California Gnatcatcher (*Polioptila californica californica*), which appears to be absent from the central and eastern Santa Monica Mountains (no current or historical records), and several rare *Dudleya* species. In the Study Area and at lower elevations toward the coast, certain sensitive species may be found in ashy buckwheat scrub, but most of these also occupy arid scrub well inland that does not contain ashy buckwheat (e.g., Greater Roadrunner *Geococcyx californianus*, Loggerhead Shrike *Lanius ludovicianus* in winter). Of course, future research may reveal the presence of species that are restricted to this

habitat (a population of the widespread square-spotted blue butterfly *Euphilotes battoides* apparently nectars mainly or exclusively on this buckwheat, but it is not recognized as a distinct taxon, and many populations of this butterfly are similarly restricted throughout the State).

The other type of buckwheat scrub in the Study Area is dominated by California buckwheat (*Eriogonum fasciculatum*), a species widely distributed in the state, with varieties occurring well out into the Mojave Desert. It is among the most abundant shrub species in the Study Area and is often sub-dominant within mixed coastal scrub and open chaparral. For this reason, we did not find that it was a rare community. As with ashy buckwheat scrub, special-status species are associated with California buckwheat scrub both in the Study Area and elsewhere in its range, and it is widely used by a variety of wildlife taxa, particularly nectaring butterflies and various other arthropods. Along with deerweed (*Acmispon glaber*), it is one of the first plant species to emerge post-fire, often covering hundreds of acres after burns. While it can become invaded with non-native grasses, which fill in the spaces between plants, on well-drained soil it is extremely resistant to these same invaders. We therefore do not find that this type of scrub is itself unique or rare in the Study Area, or that it is easily-disturbed (any more than any native habitat could be considered susceptible to some level of disturbance).

In summary, we determined that buckwheat scrub habitats dominated by *E. cinereum* and *E. fasciculatum* contribute to overall biodiversity, but are not particularly rare or easily disturbed, and so are best considered Stewardship Habitat.

Figure 15. Recommended Stewardship Habitat: California Buckwheat Scrub (foreground), east of Malibu Country Club along Encinal Canyon Road.

Restoration Habitat
Several areas of the Santa Monica Mountains would have qualified as ESHA in their original state except for a pre-existing authorization to disrupt resources, such as clearing for fire or flood control, which precludes them from being considered ESHA.[35] We call these areas "Restoration Habitat" to reflect the need for them to be restored to rise to the level of ESHA status. Areas of Restoration Habitat may continue to provide important habitat values for native wildlife species, but some of these disturbed and degraded areas may also represent "ecological sinks" for certain species. In such sinks, rates of mortality (which may be increased due to predation or other factors) exceed rates of reproduction (which may be reduced due to parasitism, inadequate foraging habitat, or other factors), such that local population levels can only be maintained through immigration of individuals from surrounding areas. Detailed field investigations beyond the scope of our study would be needed to determine the true value that different areas of Restoration Habitat hold for various native wildlife populations in the Study Area.

Based on the mapping available, we consider the following vegetation types to be Restoration Habitat by virtue of their urban/degraded state (total 834 acres):

- Urban-California Sycamore (53.4 acres)
- Urban-California Sycamore-Coast Live Oak (269.7 acres)
- Urban Coast Live Oak (492.2 acres)
- Willow spp./Giant Reedgrass Superalliance (18.6 acres)

We also include Coastal Strand (unmapped) within this designation, which is variably degraded dune or beach-associated scrub growing on sand associated with the shoreline of the Pacific Ocean, with many characteristic associated species (e.g., *Atriplex leucophylla*). It is extremely localized in the Study Area, found at both Leo Carrillo and Topanga Beaches. Because of the high degree of endemism in this habitat, as well as its rarity and lack of protection in the region, any remaining, intact occurrence should be considered for ESHA status. Since most, if not all, Coastal Strand habitat in the Study Area continues to be degraded by "normal" use, we recommend that it be considered Restoration Habitat for now.

We also categorize as Restoration Habitat occurrences of ESHA that are within active fuel-modification zones, such as brush-clearance strips along roads (typically 8 feet wide) and other areas of chronic disturbance. Based on our calculations, these areas add approximately 900 additional acres to Restoration Habitat, bringing the total to approximately 1,789 acres.

In addition, certain areas that could be identified as potential ESHA in this report are best classified as "Restoration Habitat" if they occur within existing fuel-modification zones,

[35] These areas might also be termed "Degraded ESHA" except that the definition in Section 30107.5 of the Coastal Act effectively precludes recognizing degraded areas as ESHA.

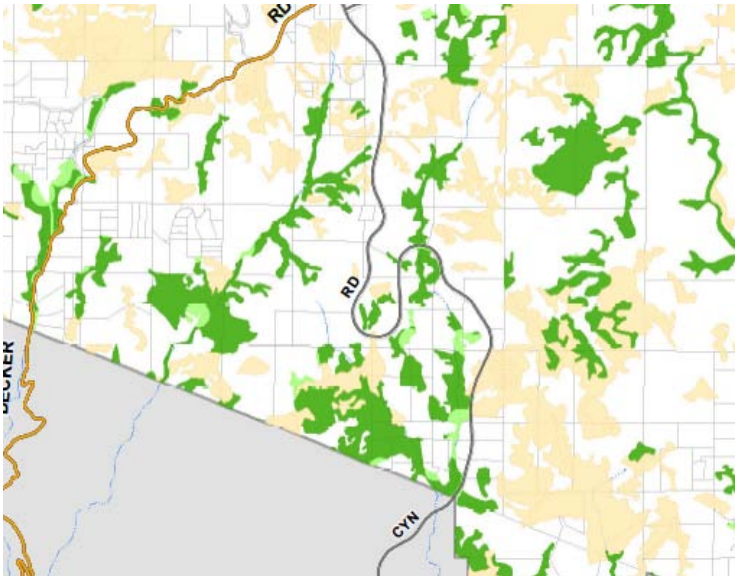
or are otherwise being degraded in order to comply with legal obligations. Examples include Escondido Canyon, where the edges of the stream are dotted with houses, and rural neighborhoods built into oak groves and other ESHA, such as at Monte Nido (Figure 16a) and El Nido (Figure 16b).

Figure 16a. Recommended Restoration Habitat: Oak Woodland with houses, Monte Nido.

Figure 16b. Recommended Restoration Habitat: Riparian near houses, El Nido (Dry Canyon, above Solstice Canyon Park).

Figure 17 shows a representative example of how these habitat types are distributed in the Study Area.

Figure 17. ESHA (green), Restoration Habitats (pale green), and Stewardship Habitats (tan) along lower Encinal Canyon Road. Note: ESHA buffer is not shown here.



The remainder of the native habitat in the Study area, while not rising to the level of ESHA, Stewardship Habitat, or Restoration Habitat, is nonetheless important to many species of plants and animals that form the natural communities of the Santa Monica

Mountains. Rather than simply leaving these areas blank on maps, we recommend the name "Habitat – Other", which acknowledges that these are indeed habitat areas that should receive some level of protection. In some cases these are areas used by very wide-ranging animals, so guidelines for their development and management – including those already in place – should reflect their contributions to the maintenance of interconnected open space of the region.

FUTURE DIRECTIONS

Priority Areas for Future Conservation Attention

Today, thanks to decades of open space acquisition, physical site constraints, and strict development regulations, the Santa Monica Mountains, including the Study Area, represent one of the least-developed expanses of open space located near a major metropolitan area in California. Most watersheds in the range are substantially protected as public open space. Three of the four largest State and federal parks and reserves of the main body of the Santa Monica Mountains south of U.S. Route 101 lie within or directly adjacent to the Study Area, Zuma/Trancas Canyons open space (National Park Service), Malibu Creek State Park, and Topanga State Park. To the west, in Ventura County, lies the fourth and single largest reserve in the range, Point Mugu State Park. Connecting these parklands are thousands of acres of natural habitat set aside in dozens of smaller parks and reserves that together form a largely interconnected network of protected open space. Thanks to aggressive land acquisition for trail rights-of-way and efforts to link upstream watershed areas of creeks with lower stretches near the coast, and efforts to conserve strategic parcels, the "internal" interconnectedness of the Study Area has been increasing in recent years, even as new houses continue to dot the landscape. Ensuring connectivity to areas to the north of Route 101, and thus the landscape-level connectivity between the Study Area and the wider region, will depend on similar efforts to the north of the Study Area.

Still, years of even scattered development in these mountains has inevitably led to various forms of degradation of natural communities in adjacent areas. These include:

- Increased landscape fragmentation, which may directly affect movement of wildlife, isolating wildlife populations and promoting inbreeding; research in the northern Santa Monica Mountains and Simi Hills has indicated that even common, widespread species of reptile and bird showed signs of isolation and inbreeding after only a few decades of landscape fragmentation due to urban development and associated roads (Delaney et al. 2010).

- Indirect effects, such as increased parasitism of songbirds by the Brown-headed Cowbird (*Molothrus ater*).

- Replacement of native plants with exotic landscaping, which may include invasive species that can escape into adjacent natural lands, either by seeds or vegetatively.

- Irrigation that facilitates invasion of natural areas by harmful exotic ants.

- Clearance of native brush for fuel modification, with resulting invasion of cleared areas by non-native weeds and grasses.

- Increased fire frequency, which can result in type-conversion of habitats, invasion of communities by exotic weeds, and intensified brush-clearance practices to prevent against future loss of structures.

- Increased on- and off-site erosion from loss of shrub cover and from increased fire frequency, with the resultant sedimentation of creeks being linked in the Santa Monica Mountains to increased rates at which adult Coast Range newts (*Taricha torosa*) cannibalized their young (Kerby and Kats 1998).

- Pollution of streams and drainages through pet and domesticated animal waste, and dumped trash.

- Increased water runoff and continuous discharge of treated wastewater into streams, both of which disrupt natural runoff patterns, facilitating invasion by exotic species.

- Increased noise and night-lighting.

- Increased mortality of wildlife due to such causes as vehicle strikes, window-kills of birds, chemical poisoning, predation of wildlife by cats (pets and feral), and spread of pathogens by pets.

- Increased use of potentially damaging pesticides, herbicides, and fungicides, especially for viticulture, which is becoming an important land use in the Study Area and elsewhere in the Santa Monica Mountains.

The cumulative effects of these forms of degradation may be considerable, even in areas well removed from them. The 8% urbanization threshold identified by Riley et al. (2005) has already been exceeded by many of drainages within the Study Area suggesting that their resources may be irreversibly degraded for all practical purposes. Clearly, maintaining the ecological integrity of the Study Area, as well as the Santa Monica Mountains as a whole, requires the development, adoption, and enforcement of a wide range of appropriate policies and regulations, but also continual research and adaptive management to lessen the impact of human disturbance.

While residential development of single-family homes (there are few subdivisions and essentially no commercial activity in the Study Area) has largely been contained to existing Rural Villages, as designated in the draft LCP, and off major roads, certain developments have now expanded to the point where they themselves form a sort of "rural sprawl", some with dozens or even hundreds of houses (at Topanga), each with its own fencing, planted trees and shrubs, gardens, brush-clearance zones, wandering pets, and water features. These areas are doubtless having a measurable effect on the natural environment of the Study Area, in that they have allowed non-native animals to invade and thrive, including eastern fox squirrel (*Sciurus niger*), now as common as the native western gray squirrel (*Sciurus griseus*) in areas like Topanga Canyon. Each additional

fence constructed means that wide-ranging wildlife like mule deer (*Odocoileus hemionus*) must re-negotiate routes to and from foraging and fawning areas – not a serious direct effect for any single property, of course, but part of the cumulative effects of more houses over more formerly-open landscape. The additional fountains and birdbaths, pet food and garbage cans means that opportunistic omnivores (like the raccoon *Procyon lotor* and American crow *Corvus brachyrhynchos*, to cite two examples), which once might have had their populations kept somewhat in check by natural limitations on food and water, now see their populations inflated, allowing more of them to depredate bird nests in nearby wildland areas.

Rural centers of development have resulted in east-west barriers in places like upper Topanga Canyon, where only a small slot of true open space exists from the bulk of Topanga State Park east of town, west toward the Stunt Ranch/Cold Creek area (Figure 18a). Other areas of developing barriers, where private parcels predominate and will likely result in limitations on east-west movement of wildlife in the eastern Study Area, include the upper Tuna Canyon Road/Saddle Peak Road area, Rambla Pacifico/upper Piuma Road, and the Monte Nido-south Calabasas area via Cold Creek Road. The western portion of the Study Area is more open (less developed), but continued home construction along upper Decker Canyon Road and Encinal Canyon Road appears to be constricting potential movement between the massive Zuma/Trancas Canyons open space and the Arroyo Sequit-Leo Carrillo State Park open space west of Decker Canyon (Figure 18b). North-south connections, critical for species like mule deer and mountain lion (*Felis concolor*) to move between the Santa Monica Mountains and open space areas to the north (including the National Forest areas far to the north), are generally some distance to the north of the Study Area, but a "wall" of private parcels could result in the development of an actual barrier of large, gated homes in places like the area between Topanga Canyon Road and Old Topanga Canyon Road; the "Mulholland Curve" along Mulholland Highway near Stunt Road (east of Gillette Ranch; Figure 18c); and at the top of the Study Area from the vicinity of the Malibu Country Club, east across Kanan Road up to Castro Peak (Figure 18d).

Figure 18a-d. "Chokepoints" and potential constriction areas associated with home construction in the Study Area (red dots indicate structures plus 200 feet of fire clearance).

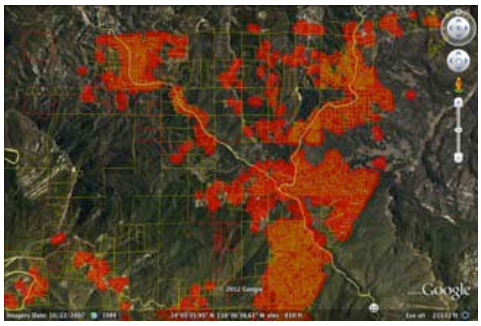


Figure 19a. Topanga area.

Figure 19b. Upper Decker Canyon area.

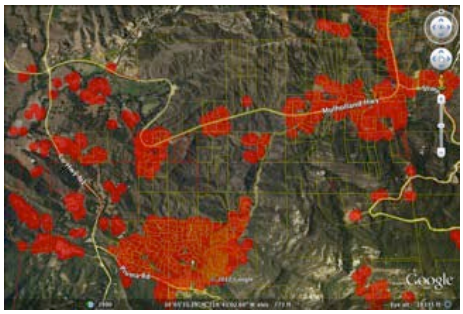
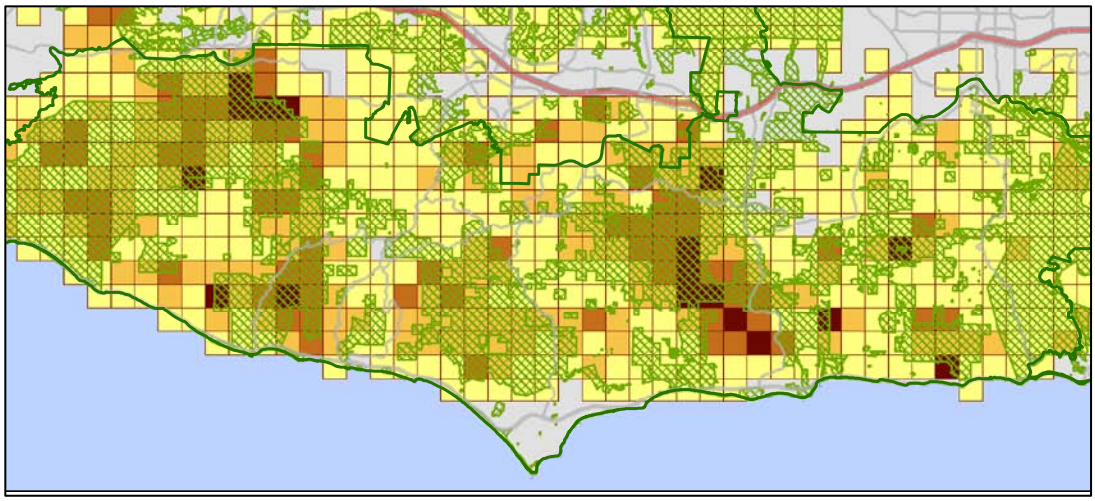


Figure 19c. “Mulholland Curve” east of Gillette Ranch.

Figure 19d. Kanan Rd. and Mulholland Hwy.

These patterns are cause for concern for certain wide-ranging species, such as the mountain lion, which move throughout the Study Area in search of prey and denning areas. While the level of development in the interior of the Santa Monica Mountains (i.e., the Study Area) is probably low enough to still allow relatively free, safe movement of mountain lions, an increase in large homes, fencing, road traffic, and other forces could jeopardize their continued presence here. Thanks to recent data from radio-tagged lions, we now know which parts of the Santa Monicas could be considered high-use areas based on the number of hits from satellite tracking devices. In general, canyon bottoms, wooded areas, and other large blocks of dense vegetation appear to be used most heavily by lions, with developed areas distinctly avoided, particularly at the edge of open space. Obviously, both private lands and public lands alike are used by lions, though distinct concentrations of activity appear to be associated with existing public lands in the Study Area, most of which are reserves (Figure 19; but note high use in area of private land south of Malibu Creek State Park, near the lower-center portion of the map). Whether this is due to lions preferring the lack of development in public lands, or because most public lands in the Study Area include mesic canyons and woodland habitat (presumably preferred by both lions and their main prey source, mule deer), is not known.

Figure 19. Mountain lion detections, 2002-2011 (cropped view of vicinity of Study Area). Map courtesy of National Park Service. Green hatching indicates public lands.



At a smaller scale, small, seemingly insignificant canyons and tributaries, such as lower Encinal Canyon, which has a few houses and a road running down the middle, may still support a wealth of rare plants. Such areas should be considered priorities for a variety of conservation activities, including conservation easements (on currently-developed properties that still retain considerable open space) or, where appropriate, by a purchase or donation involving a local conservation group or resource agency.

Lower Encinal Canyon, which is largely private land, supports the only known occurrence of Sonoran maiden fern (*Thelypteris puberula* var. *sonorensis*) in the Santa Monica Mountains, ocellated Humboldt lily (*Lilium humboldtii* ssp. *ocellatum*, a range-restricted taxon of CNPS Rank 4.2), two species of horsetail (*Equisetum* spp.), and a thriving population of western gray squirrel (a Stewardship Species); see Figure 20.

Figure 20. Lower Encinal Canyon through private property upstream of Charmlee Park.

At the opposite end of the Study Area, Topanga Canyon is bisected by a major road and runs under and through numerous driveways and culverts, and still supports all four of the aquatic amphibians known from the Study Area (including Coast Range newt). Rare plants and other special-status species occur frequently within and adjacent to designated Rural

Villages in Topanga; for example, important populations of Santa Susana tarplant and Plummer's mariposa-lily occur on sandstone outcrops only a few meters from Fernwood Pacific Drive. Elsewhere in the Study Area, such as the "Badlands", an area of arid scrub and chaparral along Mulholland Highway near Stunt Road (Figure 21), support significant scrub habitats, and provide a link to larger open space outside the Study Area which could prove critical for certain wide-ranging species.

Figure 21. "Badlands" along Mulholland Highway near Stunt Road.

Of course, designating habitat ESHA alone cannot address all these issues. Rather, a combination of strict environmental and land-use laws, a vigilant local community to observe those laws (and to encourage their neighbors to do the same), and the biological qualities and quirks of the particular habitat areas all may contribute to the retention of biodiversity - but not always. For example, recent surveys of Malibu Creek, located almost entirely with a State Park (but much more urbanized upstream of here), found only one of the four target amphibian species, the ubiquitous Baja California treefrog (*Pseudacris h. hypochondriaca* = *P. regilla*), illustrating that simply setting aside reserves will not necessarily "save" certain species.

Still, private lands continue to be especially vulnerable to unforeseen degradation; during our field investigations, we found non-native European olive trees (*Olea europaea*) recently planted along the road down to Encinal Creek. These trees now represent a threat to the integrity of the riparian woodland that extends from the planting area miles downstream to the ocean. This kind of unnecessary and potentially harmful action can be effectively avoided or minimized through development and implementation of appropriate land-use policies, allowing human uses of the land to be planned and executed in ways compatible with the effective conservation of natural resources.

While the Study Area's general biodiversity is well understood, more elusive are the specifics of which rare species would be expected to be most imperiled in the future, or which areas are likely to face increased conflicts between development and biodiversity conservation. We hope our analysis sheds light on this subject.

To that end, we provide a list below of the larger aggregations of private parcels in the Study Area, since these are the areas where people are most likely to build more homes, review ESHA determinations, or purchase lands for conservation purposes (west to east):

1. Decker-Encinal
2. Upper Encinal Road/Malibu Country Club
3. Upper Latigo Road/West Castro Peak
4. Escondido Canyon/Upper Ramirez
5. Puerco Canyon
6. Monte Nido-Calabasas
7. Piuma Road/Scheuren Road
8. Carbon Canyon
9. North Topanga
10. Saddle Peak/Upper Tuna Canyon

During the late 1990s, in an effort to prioritize areas for potential conservation acquisition, the National Park Service identified four highest priorities based on resource value and recreational potential. Three of those areas are included in our list above, "Backbone Corridor" (= our "Decker/Encinal" above), "Upper Ramirez" (see #4), and "Piuma" (see #7). The fourth area identified, "Malibu Canyon", was largely private east of Las Virgenes Road/Malibu Creek Road at the time of the analysis (and would have made our list), but subsequent acquisitions in the past 10 years have resulted in large areas now being managed by National Park Service and other agencies.

Future Threats to Natural Resources

Land conservation activity in the Santa Monica Mountains if fairly recent, increasing after the middle of the twentieth century and continuing to the present time. For more than 100 years earlier, large parts of the range, including the Study Area, were rangeland for cattle and sheep. Ranching operations existed in many areas, leaving meadows that are now choked with tall weeds and slopes that have largely grown back to chaparral and coastal scrub. Off-road vehicle use is another damaging earlier land use that is essentially nonexistent today. In recent decades, these earlier forms of land impact have been traded for those of scattered, low-density residential development. The current era has seen major losses of wildflower fields, short-grass grasslands, and grass/scrub habitats. Irrigation and runoff have increased, and substantial inputs of treated wastewater have transformed many intermittent streams to perennial ones.

Some of these changes are being studied; for example, stream surveys in 13 major drainages within the Study Area have revealed wide "contamination" by non-native species, such as crayfish (*Procambarus clarkii*) and, more recently, New Zealand mud

snail (*Potamopyrgus antipodarum*)[36]. More pernicious have been the threats that are virtually invisible until their "symptoms" are detected, too late to avoid the problem, such as a recent, unexplained die-off of southern steelhead *Oncorhynchus mykiss irideus* in Malibu Creek (Dagit et al. 2009).

Assessing these threats is one thing; tying them to specific impacts, such as declines of species, is quite another. With a paucity of local research on these topics, finding examples of plant or animal species whose decline or extirpation from the Study Area has resulted directly, or even indirectly, from local land use decisions has generally proven elusive. This should not be interpreted to mean that the development of houses, vineyards, roads, and other human-built features are having no meaningful effect on natural resources. In fact, these patterns have been little-studied except for a handful of taxa (e.g., mountain lion, steelhead, aquatic amphibians and turtles). No detailed, systematic surveys of birds, small mammals, reptiles, or butterflies have been attempted, and research on plant distribution within the Study Area has occurred rarely and opportunistically (e.g., following a major burn in the Topanga area; NPS archives). Even the intensive Los Angeles County Breeding Bird Atlas project in the 1990s collected data only at the level of blocks of greater than 6,000 acres, making statements about the diversity of sites or even watersheds virtually impossible. Of course, bird-watching remains popular, and with the recent innovation of the observation-sharing website ebird (www.ebird.org), we know what bird species are still around. Museum collections help us to determine the few that have been lost. For most species of small mammals, reptiles, terrestrial amphibians, and nearly all insects (including butterflies), the extent of population change, positive or negative, remains an open question.

Thanks to directed searches by botanists from the National Park Service, we can say that nearly all of the plant species historically known from the Study Area are still present in the Study Area. Exceptions include a handful of rare annuals, such as mustang mint (*Monardella lanceolata*). A few plant species known from only one to a handful of occurrences (see Table 4) may be cause for concern, although, given the Study Area's diversity, it is just as likely that many have long been rare, and that their rarity today is a completely "natural" state as opposed to something humans have caused through land-use decisions. As land continues to be purchased for conservation, and as more houses are built in the Study Area, we hope that the information in this report, together with implementation of suggested development guidelines, will allow a great diversity of native species, habitats, and landscapes to persist here with vitality and ecological integrity.

LITERATURE CITED

AIS (Aerial Information Systems, Inc.) and ESRI (Environmental Systems Research Institute. 2007. USGS-NPS Vegetation Mapping Program. Santa Monica Mountains National Recreation Area Photo Interpretation Report. Submitted to Santa Monica Mountains National Recreation Area, May 23, 2007.

[36] http://www.rcdsmm.org/new-zealand-mudsnail

Barbour, M. G., T. Keeler-Wolf, and A. A. Schoenherr. 2007. Terrestrial Vegetation of California. Third Edition. University of California Press, Berkeley.

Bell, E., R. Dagit, and F. Ligon. 2011. Colonization and persistence of a southern California steelhead (*Oncorhynchus mykiss*) population. Bulletin of the Southern California Academy of Sciences. 110(1):1–16.

Bonebrake, T. and D.S. Cooper. Unpublished. A Hollywood drama of extinction and persistence over a century of urbanization. Manuscript submitted to *Animal Conservation*.

Boyd, S. 1999. Vascular flora of the Liebre Mountains, Western Transverse Ranges, California. Rancho Santa Ana Botanical Garden Occ. Publications No. 5. November 1999.

CCC (California Coastal Commission). 2012. Staff report addendum for W26a, Monterey County Major Amendment Number 1-12 Part 1 (Del Monte Forest Update and Pebble Beach Company Concept Plan). May 8, 2012.

CNDDB (California Department of Fish and Game, Natural Diversity Database). 2011. Special Animals. List dated January 2011.

CNDDB (California Department of Fish and Game, Natural Diversity Database). 2012. Search report dated June 10, 2012 for the Malibu Beach, Point Dume, Topanga, and Triunfo Pass USGS quadrangles.

CNDDB (California Department of Fish and Game, Natural Diversity Database). 2013. Special Vascular Plants, Bryophytes, and Lichens List. List dated October 2013.

CDFG (California Department of Fish and Game). 2003. Atlas of the Biodiversity of California. State of California Resources Agency.

CDFG (California Department of Fish and Game), California Native Plant Society, T. Keeler-Wolf, and J. Evens. 2006. Vegetation Classification of the Santa Monica Mountains National Recreation Area and Environs in Ventura and Los Angeles Counties, California. Submitted to National Park Service, January 2006.

Cooper, D. S. and P. W. Mathewson. 2009. Griffith Park Wildlife Management Plan. Available online at: www.griffithparkwildlife.org.

Cooper, D. S. 2012. Rare plants of Griffith Park, Los Angeles. Fremontia 38(4)/39(1):18-24.

Dagit, R., C. Swift, and K. Reagan. 2003. Topanga Creek Watershed Southern Steelhead Trout: Preliminary Watershed Assessment and Restoration Plan Report. Resource Conservation District of the Santa Monica Mountains, Topanga, CA.

Dagit, R., S. Drill, and B. Meyer. 2005. Historical Distribution of Southern Steelhead

Trout in the Santa Monica Bay Region. Prepared for CA Department of Fish and Game and NOAA Fisheries. Resource Conservation District of the Santa Monica Mountains, Topanga, CA.

Dagit, R. and S. Williams. 2005. Summary of Tidewater Goby Observations, Malibu Lagoon, Malibu, CA 1996-2000 for Permit PRT-811188. Data collected for Caltrans Mitigation Contract. Repair of the Pacific Coast Highway Bridge over Malibu Lagoon. Submitted to USFWS, March 2005. Resource Conservation District of the Santa Monica Mountains, Topanga, CA.

Dagit, R., M. Graves, and C. Wheeland. 2006. Topanga Turtle Study (*Emys marmorata pallida*) 2002-2006. Funded by a grant from the Santa Monica Bay Restoration Commission. Resource Conservation District of the Santa Monica Mountains, Topanga, CA.

Dagit, R., S. Adams, and S. Drill. 2009. Die off and current status of Southern Steelhead Trout (*Oncorhynchs mykiss*) in Malibu Creek, Los Angeles County, USA. Southern California. Academy of Sciences Bulletin 108(1):1-15.

Delaney, K. S., S. P. D. Riley, R. N. Fisher. 2010. A rapid, strong, and convergent genetic response to urban habitat fragmentation in four divergent and widespread vertebrates. PLoS ONE 5(9): e12767.

Dixon, J. 2003. Memorandum to Ventura Staff (California Coastal Commission): Designation of ESHA in the Santa Monica Mountains. March 25, 2003.

Emmel, J. F., R. H. T. Mattoni. 1989(90). A new subspecies of *Satyrium auretorum* (Lycaenidae) from the Santa Monica Mountains of southern California. Journal of Research on the Lepidoptera 28(1-2):100–104.

Fenn, M. E., E. B. Allen, and L. H. Geiser. 2011. Chapter 13, Mediterranean California. Pp. 143–169 *in* Pardo, L. H., M. J. Robin-Abbott, and C. T. Driscoll, eds. Assessment of nitrogen deposition effects and empirical critical loads of nitrogen for ecoregions of the United States. Genera Technical Report NRS-80. U. S. Department of Agriculture, Forest Service, Northern Research Station, Newtown Square, PA.

Gamradt, S. C., L. B. Kats, and C. B. Anzalone. 1997. Aggression by non-native crayfish deters breeding in California newts. Conservation Biology 11:793–796.

Gamradt, S. C. and L.B. Kats. 1996. Effect of introduced crayfish and mosquitofish on California newts. Conservation Biology 10:1155–1162.

Heath, F. 2004. An Introduction to Southern California Butterflies. Mountain Press Publishing Company, Missoula, MT.

Holland, R. 1986. Preliminary list of terrestrial natural communities of California. Department of Fish and Game, Sacramento, California.

Johnson, M. D. 2007. Measuring habitat quality: a review. The Condor. 109:489-504.

Kerby, L. J. and L.B. Kats. 1998. Modified interactions between salamander life stages caused by wildfire-induced sedimentation. Ecology 79:740–745.

Knudsen, K. 2007. An annotated checklist of the lichens of Santa Monica Mountains, in Flora and Ecology of the Santa Monica Mountains, D.A. Knapp, Ed., Southern California Botanists, Fullerton, CA.

Long, M. C. 1993. Birds of Whittier Narrows Recreation Area, Los Angeles County, California. Whittier Narrows Nature Center Associates.

Los Angeles County Sensitive Bird Species Working Group. 2009. Los Angeles County's sensitive bird species. Western Tanager 75(3):1–11.

McAuley, M. 1985. Wildflowers of the Santa Monica Mountains. Canyon Publishing Co., Canoga Park, CA. (including "Plant Geography", T. Thomas, p. 544-546).

McCallum, M. L. 2007. Amphibian decline or extinction? Current declines dwarf background extinction rate. Journal of Herpetology 41:483–491.

NPS (National Park Service) 1999. Resource Management Plan. Associated materials for preparation of this plan, as well as various drafts, examined at National Park Service archives, July 2012.

Magney, D. L. 2010. Terrestrial gastropods of Los Angeles County. Online checklist dated 20 August 2009, updated 29 September 2010. [Website not functional at time of publication.].

Mathewson, P., S. Spehar, and D. S. Cooper. 2008. A preliminary large mammal survey of Griffith Park, Los Angeles, California. Bulletin of the Southern California Academy of Sciences 107:57–67.

Mattoni, R., G. F. Pratt, T. R. Longcore, J.F. Emmel, and J.N. George. 1995 (1997). The endangered quino checkerspot butterfly, *Euphydryas editha quino* (Lepidoptera: Nymphalidae). Journal of Research on the Lepidoptera 34:99–118.

National Oceanographic and Atmospheric Administration. 2005. Endangered and threatened species; designation of Critical Habitat for seven Evolutionarily Significant Units of Pacific salmon and steelhead in California. Federal Register 70:52488–52627.

Quality Code Publishing. 2012. City of Malibu Local Coastal Program, Local Implementation Plan. Adopted September 13, 2002. Local Implementation Plan is current through Supplement No. 3, March 2012, up to and including LCPA 09-004, certified on February 8, 2012. http://www.qcode.us/codes/malibu-coastal/

Rathbun, G. B., N. J. Scott, Jr., and T. G. Murphey. 2002. Terrestrial habitat use by pacific pond turtles in a Mediterranean climate. The Southwestern Naturalist 47(2):225-235.

Raven, P. H. and H. J. Thompson 1966. Flora of the Santa Monica Mountains. Revised January 1977 by D. S. Verity. University of California, Los Angeles.

Riley, S. P. D., G. T. Busteed, L. B. Kats, T. L. Vandergon, L. F. S. Lee, R. G. Dagit, J. L. Kerby, R. N. Fisher, and R. M. Sauvajot. 2005. Effects of urbanization on the distribution and abundance of amphibians and invasive species in southern California streams. Conservation Biology 19:1894–1907.

Roberts, F. M., Jr., S. D. White, A. C. Sanders, D. E. Bramlet, and S. Boyd. 2004. The vascular plants of western Riverside County: An annotated checklist. F. M. Roberts Publications, San Luis Rey, California.

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2008. A Manual of California Vegetation, second edition. California Native Plant Society.

Sauvajot, R. M., M. B. Buechner, D. A. Kamradt, and C. M. Schonewald. 1998. Patterns of human disturbance and response by small mammals and birds in chaparral near urban development. Urban Ecosystems 2(4):279-297.

Stephenson, J.R. and G.M. Calcarone. 1999. Southern California mountains and foothills assessment: Habitat and species conservation issues. Gen. Tech. Report GTR-PSW-172. Albany, CA: Pacific Southwest Research Station, Forest Service, USDA; 402 pp.

Stralberg. 1999. A landscape-level analysis of urbanization influence and spatial structure in chaparral breeding birds of the Santa Monica Mountains, California: A thesis submitted in partial fulfillment for the degree of Master of Science (Natural Resources and Environment). University of Michigan.

Swift, C., T.R. Haglund, M. Ruiz, and R.N. Fisher. 1993. The status and distribution of the freshwater fishes of southern California. Bulletin of the Southern California Academy of Sciences 92(3):101-167.

Syphard, A. D., V. C. Radeloff, J. E. Keeley, T. J. Hawbaker, and M. K. Clayton. 2007. Human influence on California fire regimes. Ecologial Applications 17:1388–1402.

Syphard, A. D., V. C. Radeloff, T. J. Hawbaker, and S. I. Stewart. 2009. Conservation threats due to human-caused increases in fire frequency in Mediterranean-climate ecosystems. Conservation Biology 23:758–769.

U.S. Fish and Wildlife Service. 2006. Endangered and threatened wildlife and plants; designation of Critical Habitat for *Astragalus brauntonii* and *Pentachaeta lyonii*. Federal Register 71:66374–66423.

U.S. Fish and Wildlife Service. 2008. Endangered and threatened wildlife and plants; revised designation of Critical Habitat for the tidewater goby (*Eucyclogobius newberryi*). Federal Register 73:5920–6006.

U.S. Fish and Wildlife Service 2009a. *Dudleya cymosa* ssp. *marcescens* (Marcescent Dudleya). 5-Year Review: Summary and Evaluation. USFWS. Ventura Fish and Wildlife Office, Ventura, California. August 2009.

U.S. Fish and Wildlife Service 2009b. *Dudleya cymosa* ssp. *ovatifolia* (Santa Monica Mountains Dudleya). 5-Year Review: Summary and Evaluation. USFWS. Ventura Fish and Wildlife Office, Ventura, California. November 2009.

Weins, D., L. Allphin, M. Wall, M.R. Slaton, and S. Davis. 2012. Population decline in *Adenostoma sparsifolium* (Rosaceae): An ecogenetic hypothesis for background extinction. Biological Journal of the Linnean Society 105:269-292.

APPENDICES

Appendix A. Species Lists.

Table A1. Special-status wildlife of Los Angeles County Coastal Zone.

This list does not include species known only from portions of the Santa Monica Mountains outside the Coastal Zone.

Species	Common name	Status	Distribution and habitat	Representation on public vs. private lands in Coastal Zone
MAMMALS				
Antrozous pallidus	Pallid bat	CSC	Few records; probably widespread in coastal sage scrub, open chaparral.	Unknown, but large areas of suitable foraging habitat on public lands.
Corynorhinus townsendii	Townsend's big-eared bat	CSC	Few records found; likely present.	Unknown.
Euderma maculatum	Spotted bat	CSC	Few records found; may be present.	Unknown.
Eumops perotis californicus	Western mastiff bat	CSC	Few records found; known from Topanga in 1996 (R. Dagit in litt.).	Unknown, but large areas of suitable foraging and roosting habitat on public lands.
Lasiurus blossevillii	Western red bat	CSC	Few records, but probably present seasonally in canyons (as it is in Griffith Park; Cooper unpubl. data).	Unknown, but large areas of suitable foraging and roosting habitat on public lands.
Lasiurus xanthinus	Western yellow bat	CSC	No specific records, but probably present in (planted/non-native) palms (as it is in Griffith Park; Cooper unpubl. data).	Unknown, but large areas of suitable foraging habitat on public lands, potential roosting sites on private lands.
Neotoma lepida intermedia	Desert woodrat	CSC	"Trapped at Ramblo Pacifico, spring 1976" (NPS archives); where present, occurs in dry coastal sage scrub, especially that with cactus.	Unknown, but large populations (in low scrub) probably occur widely on both public and private lands.
Taxidea taxus	American badger	CSC	Modern records include two sightings from Kanan Rd. (vic. Newton Cyn., vic. Dume Motorway) in 2006 (CNDDB); reportedly trapped vic. Trippet Ranch, Topanga State Park in 1987 (NPS archives); "several roadkills…along Topanga Canyon Blvd. between 1996 and [2012]. Concentrations in lower reach [of Topanga Canyon] through the Narrows and near Summit Valley Park at the top of the watershed (R. Dagit in litt.); older specimen records from Latigo Cyn., Saddle	Unknown; more records needed, but probably occurs in large blocks of public lands currently protected as reserves.

Species	Common name	Status	Distribution and habitat	Representation on public vs. private lands in Coastal Zone
			Peak. Probably occurs widely in low numbers in areas of grassland and low scrub with grassy openings.	
Bassariscus astutus	Ringtail	N/A	Recent records (including roadkill sightings) include along Malibu Creek, Malibu Creek State Park in 2012 (K. Delaney in litt.); lower Malibu Canyon (1999 specimen); and the Summit Valley Park area [of Topanga Canyon] (= just north of the study area)" (R. Dagit in litt.). Apparently found in rocky canyons with year-round water.	Unknown, but likely secure in large public reserves if present (e.g., Malibu Creek State Park). Population in Santa Monica Mountains presumably highly isolated.
Dipodomys agilis	Pacific kangaroo-rat	N/A	Several early specimens (last 1976) widely distributed (e.g., Saddle Peak, "head of Escondido Canyon"; north of Study Area "trapped in Cheeseboro Cyn., July 1988" (NPS archives). Found in open grassland (including grazed areas) and sparse, arid scrub.	Unknown; may be extirpated, but may persist in areas like "Badlands" northeast of Gillette Ranch (private lands).
Spilogale gracilis	Spotted skunk	N/A	Very poorly known; Recent photo from Trancas Cyn. (K. Delaney, pers. comm.); known from other sites in Santa Monica Mountains and so may persist. Widely extirpated in southern California, where it occurred in arid scrub and rocky areas.	N/A
REPTILES				
Anniella pulchra pulchra	Silvery legless lizard	CSC	Single record, 1965 specimen from Malibu Cyn.; 2010 capture just north of Study Area (K. Delaney). Can be locally common in areas of sandy/loose soil, oak woodland with deep oak duff for burrowing.	Unknown; may occur widely in suitable habitat.
Phrynosoma blainvillii	Coast horned lizard	CSC	Most recent records apparently between Gillette Ranch and Calabasas ("Badlands" and ridges). Apparently reproducing vic. Old Topanga Canyon, Topanga, and Tuna Canyon Motorway (R. Dagit in litt.). In the eastern Santa Monicas, favors chamise chaparral and	Poorly known; presumably well-protected along eastern portion of Castro Crest, but probably also dependent on habitat on private lands vic. "Badlands" northeast of Gillette Ranch (several recent

Species	Common name	Status	Distribution and habitat	Representation on public vs. private lands in Coastal Zone
			gravelly soil (DSC, pers. obs.). Recorded more widely historically.	records, *fide* M. Beck, NPS), Castro Peak, and other areas of chamise chaparral.
Emys marmorata	Southwestern pond turtle	CSC	Most of remaining population (2009 data) along Topanga Creek; small numbers along Trancas, Zuma and Malibu creeks. Distributed more widely on 1989 surveys (R. Dagit via email).	Population probably highly dependent on both public and private lands, particularly in Topanga area.
Lampropeltis zonata	San Diego mountain kingsnake	CSC	Scattered recent records from Topanga area (incl. Red Rock, Old Topanga/Zuniga Rd., and lower Topanga Cyn.; R. Dagit in litt.); vic. Piuma Rd. and Stunt Ranch (Field Herp Forum), Solstice Canyon (K. Delaney in litt.), and just outside the Study Area at Temescal Canyon and Rocky Oaks Park (K. Delaney, unpubl. data). This species is probably still widespread in canyons and other areas with rocky outcrops.	Poorly known; most of population probably in rocky areas like outcrops and rugged canyons, most of which are now in public lands
Salvadora hexalepis virgultea	Coast patchnose snake	CSC	Found 2002-10 vic. Zuniga Rd./Old Topanga Cyn. (R. Dagit in litt.); 1994 specimen from Piuma Rd. Presumably co-occurs with coast horned lizard in similar habitat – arid scrub with loose soil for burrowing.	Poorly known; presumably well-protected along eastern portion of Castro Crest, but possibly also dependent on habitat on private lands with similar habitat.
Thamnophis hammondii	Two-striped garter-snake	CSC	Recent records from Topanga area, most commonly in lower Topanga Cyn. south of town (R. Dagit in litt.); presumably still widespread. Numerous older specimens, including from Malibu Creek, Cold Creek, Trancas Cyn., Las Flores Cyn., Esconido Cyn. Restricted to streams and associated riparian/canyon-bottom habitat.	Many populations in canyons in public lands; likely occurs on private parcels within larger drainages (e.g., Topanga Creek, Escondido Cyn.).
Coluber constrictor	Yellow-bellied racer	N/A	Observed in Zuniga Rd./Old Topanga Cyn. (R. Dagit, in litt.). Single modern specimen (1995) from “west side of” Pepperdine Univ., presumably vic. Puerco Cyn. Early (pre-1950) specimens from Tapia Park (which formerly	Unknown; more information is needed, but large public reserves are probably important for this species.

Species	Common name	Status	Distribution and habitat	Representation on public vs. private lands in Coastal Zone
			supported extensive grassland habitat) and Encinal Cyn. Possibly declining, but may persist around large grassy openings.	
AMPHIBIANS				
Taricha torosa	Coast range newt	CSC	Found in most larger drainages in the Coastal Zone, particularly those stretches with large, deep breeding pools and tree canopy.	Many populations in canyons in public lands; likely occurs on private parcels within larger drainages (e.g., Topanga Creek, Escondido Cyn.).
FISHES				
Eucyclogobius newberryi	Tidewater goby	FE, CSC	Introduced populations at Malibu Lagoon (City of Malibu) and lower Topanga Creek (the latter resulting from individuals dispersing from Malibu Lagoon); Critical Habitat designated south of the Study Area (i.e., upstream to vic. Rindge Dam, lower Malibu Creek) but its status upstream of Malibu Lagoon is unclear and probably variable from year to year.	Present only on public lands.
Gila orcuttii	Arroyo chub	CSC	Records from Malibu Creek and (extirpated) from Topanga Creek, and probably elsewhere.	Most/all populations on public lands.
Oncorhynchus mykiss irideus	Southern steelhead	FE, CSC	Known runs (in recent years) in lower portions of Sequit, Malibu and Topanga Creek.	Areas of occurrence generally in lower-most areas of drainages where on public lands.
BIRDS				
Oreortyx pictus	Mountain Quail	N/A	Pre-2000 reports from Castro Crest, Boney Ridge (in Ventura Co.); no recent records. Apparently restricted to dense, chamise chaparral.	Most of Santa Monica Mountains population, if extant, is on public lands, but may occur on private lands at the highest elevations.
Accipiter cooperii	Cooper's Hawk	WL	Widespread and common breeding resident throughout Coastal Zone; probably the most abundant local raptor, occurring in all habitats and breeding widely in ornamental trees as well as native oak groves.	Large numbers presumably nest on public lands, as well as on private lands. Population probably continues to be augmented by planting of trees.

Species	Common name	Status	Distribution and habitat	Representation on public vs. private lands in Coastal Zone
Aimophila ruficeps canescens	Rufous-crowned Sparrow	WL	Common in grassy coastal sage scrub and rocky, open scrub throughout.	Large populations on both public and, presumably, private lands.
Artemisiospiza belli	Bell's Sparrow	WL	Last known records (early 2000s) from Castro Crest; restricted to large tracts of chamise chaparral; several breeding records in late 1990s from Decker-Encinal area.	Most of Santa Monica Mountains population, if extant, is on public lands, but may occur on private lands.
Cathartes aura	Turkey Vulture	LAC	Breeding status uncertain, but presumably nests in remote cliffs/outcrops (several historical egg sets collected in Topanga Cyn., Calabasas Peak).	Most probably nesting on public lands, but favors large tracts of open space with remote rock outcrops for nesting, so may occur locally on private lands if features are present.
Circus cyaneus	Northern Harrier	CSC	No nesting records; winter records mainly from Malibu Creek State Park, Topanga State Park. Requires extensive grassland on flat or gently-rolling topography without trees or large shrubs.	If it still occurs regularly in winter, probably largely restricted to public lands.
Elanus leucurus	White-tailed Kite	FP	Recent records of potentially nesting birds limited Malibu Creek State Park, where small numbers over-winter; breeding confirmed at Trippet Ranch, Topanga State Park in late 1990s but current status there unknown. Requires extensive grassland on flat or gently-rolling topography without trees or large shrubs.	Foraging takes place in extensive grassland, which is essentially restricted to public lands in Coastal Zone (Malibu Creek S.P./Gillette Ranch). Given very small population (1-2 pairs), unlikely to occur widely on private lands.
Falco columbarius	Merlin	WL	Widespread winter visitor to all habitats; no longer considered sensitive.	N/A
Geococcyx californianus	Greater Roadrunner	LAC	Presumably still occurs at low densities in coastal sage scrub and open (often arid) chaparral; few recent records (www.Ebird.org), both coastal (Pepperdine Univ., Pt. Dume) and inland (Calabasas).	Poorly-known; may be dependent on private and public lands alike, but surveys needed to clarify current distribution and habitat needs.
Picoides villosus	Hairy woodpecker	LAC (lowland populations)	Recent records (singles) from Malibu Creek State Park, where possibly resident. Found in mature woodland.	If present as a nester, most of population would be on public lands, e.g., Malibu Creek State Park.
Vireo bellii pusillus	Least Bell’s Vireo	FE, SE	Two known records, both recent, from Malibu Creek State Park. Found in willow riparian	If present as a nester, most of population would be on public

Species	Common name	Status	Distribution and habitat	Representation on public vs. private lands in Coastal Zone
			habitats.	lands, e.g., Malibu Creek State Park.
Cistothorus palustris clarkae	Clark's marsh wren	CSC	Nesting records from late 1990s from Malibu Country Club, the only area of suitable habitat in Coastal Zone (cattail-lined ponds).	If persists, probably stable population at Malibu Country Club.
Setophaga petechia	Yellow Warbler	CSC	Nests in several larger canyons with permanent water and mature riparian woodland, including Malibu Creek, Cold Creek and Topanga Cyn. drainages. In coastal southern California, rarely breeds away from willows (e.g., largely absent from oak woodland).	Populations occur on both public and private stretches of canyons where present.
Icteria virens	Yellow-breasted Chat	CSC	Historical egg set from "Malibu" (1942); may breed locally in dense willow riparian of canyon bottoms (e.g., Malibu Creek).	If present as a nester, most of population would be on public lands, e.g., Malibu Creek State Park.
Ammodrammus savannarum	Grasshopper Sparrow	CSC	Single record (5/28/2007) from Malibu Creek State Park (www.Ebird.org). Requires extensive grassland on flat or gently-rolling topography without trees or large shrubs.	If present as a nester, most of population would be on public lands, e.g., Malibu Creek State Park.
INVERTEBRATES				
Aglaothorax longipennis	Santa Monica Mountains shieldback katydid	CA Special	Few records found; likely present.	Unknown
Cicindela hirticollis gravida	Sandy beach tiger beach	CA Special	Possibly present at Leo Carrillo State Beach.	Unknown, but would be restricted to public lands (state beaches) if found.
Coelus globosus	Globose dune beetle	CA Special	Presumably present on sandy beaches with retained dune-like habitat, e.g., Leo Carrillo State Beach.	Entirely Coastal Zone population, if it persists, would be on on public lands.
Socalchemmis gertschi	(spider)	CA Special	Few records found; likely present.	Unknown
Trimerotropis occidentiloides	Santa Monica Mountains grasshopper	CA Special	Few records found; likely present.	Unknown
Danaus plexippus	Monarch	CA Special	Long-time winter roost at Leo Carrillo State Beach; otherwise, found in several areas of City of Malibu south of Study Area, absent from Topanga Beach (W. Sakai, via email)	Entirely on public lands.
Proceratium californicum	Valley oak ant	N/A	Early collection in Tapia Park probably	Entirely Coastal Zone population, if

Species	Common name	Status	Distribution and habitat	Representation on public vs. private lands in Coastal Zone
			extirpated; may persist vic. Malibu Creek State Park.	it persists, is on public lands.
Lycaena arota nubila	Cloudy tailed-copper	N/A	Poorly-known; nectars on golden currant (*Ribes aureum*); nearly extirpated from Griffith Park (2 individuals seen).	Unknown
Speyeria callippe comstocki	Comstock's fritillary	N/A	Poorly-known; feeds on native violet (*Viola penduncularis*) recorded May 1966 from "west fire road, Castro Peak" (K. Hughes unpubl. notes); apparently extirpated from most of the Santa Monica Mountains (C. Nagano, *via email*); no known populations south of U.S. Route 101 (K. Davenport, via email).	Unknown
Lycaena gorgon gorgon	Gorgon Copper	N/A	Recent photographs from MCSP, a known site (www.socalbutterflies.org).	Unknown away from MCSP.
Polygonia satyrus satyrus	Satyr anglewing	N/A	Known from MCSP (Heath 2004).	Unknown, but unlikely away from larger riparian areas (most public lands).
Satyrium auretorum fumosum	Santa Monica Mountains hairstreak	N/A	No records; apparently occurs to the north of Study Area (Paramount Ranch/Malibou Lake north) and is restricted to the canopy of oaks.	Unknown

Table A2a. Extirpated species (and species' roles) of the Los Angeles County Coastal Zone.

Note: these still may be present elsewhere in the Santa Monica Mountains and Simi Hills (i.e., away from the Coastal Zone/Study Area).

Species	Common name	Status	Comments
ANIMALS			
Lepus californicus bennettii	San Diego black-tailed jackrabbit	CSC	No specific records, but presumably present during ranching era.
Aquila chrysaetos	Golden Eagle	FP	Extirpated. Last pair attempted to breed in 2005 in Malibu Creek State Park; nest sites at Lobo Cyn. and Simi Peak (north of Coastal Zone) no longer active (NPS archives).
Asio otus	Long-eared Owl	CSC	Early egg sets from Agoura and Calabasas (last 1934; WFVZ) and recent nesting observations from Oak Park and Palo Comado Cyn. area (north of Coastal Zone/U.S. Route 101; www.ebird.org); presumably more widespread during ranching era.
Athene cunnicularia	Burrowing Owl	CSC	Noted as breeding in Cheseboro Canyon "in shale and sandstone outcrop burrows" with "nest locations mapped" (NPS archives); presumably present during ranching era.
Megaceryle alcyon	Belted Kingfisher	CSC	Breeding confirmed or suspected during late 1990s in Malibu Creek and Triunfo Cr. (LACBBA), but no recent records of nesting; still occurs as transient and in winter.
Lanius ludovicianus	Loggerhead Shrike	CSC	Egg set collected "Las Virgenes Cyn." in 1978 (WFVZ), and more widespread and common during ranching era.
Contopus cooperi	Olive-sided Flycatcher	CSC	Nesting confirmed in several areas during late 1990s (LACBBA; Malibu Creek, Solstice/Escondido cyn.); no recent breeding-season records; still occurs as a transient.
Catharus ustulatus	Swainson's Thrush	LAC	Early egg sets from Malibou Lake and "Malibu" (1940s; WFVZ); still occurs as a transient.
Sturnella neglecta	Western Meadowlark	LAC	Early egg set from Tapia Park (1962; WFVZ); presumably more widespread and common during ranching era; winters (when not considered sensitive) widely in patches of grassland.
Rana draytonii	California red-legged frog	FE, SSC	Early specimens (last 1965) from Trancas, Solstice, Malibu and Topanga cyns.

Species	Common name	Status	Comments
Thamnophis sirtalis	California red-sided ("South Coast") garter-snake	SSC	Early specimens (last 1967) from Tapia Park, Topanga Cyn.
Entosphenus tridentatus	Pacific lamprey	N/A	Apparently extirpated from Malibu Creek (R. Dagit, via email).
Euphydryas editha quino	Quino checkerspot	FE	Known historically from Tapia Park (near the northern extent of range), last detected 1947 (Mattoni et al. 1997).
PLANTS			*Habitat descriptions from Raven and Thompson 1966 (R/T) or McAuley 1996 (M)*
Caulanthus heterophyllus	Slender-pod jewelflower	N/A	Early records, widely-scattered (believed extirpated from Griffith Park; Cooper 2012); extant at Palo Comado Cyn. (*fide* T. Sagar, NPS); "Openings in chaparral, burns" (R/T)
Lonicera hispidula var. vacillans	Hispid honeysuckle	N/A	Single old occurrence vic. Malibu Cyn.; possibly extirpated. "Dense chaparral in bottom of deep canyons, Malibu Canyon south of Tapia Park" (R/T)
Monardella lanceolata	Lance-leaf monardella	N/A	Single old occurrence at entrance to Stokes Ranch. "Dry soil" (M)
Monolopia lanceolata	Monolopia	N/A	Single old occurrence vic. Monte Nido; extant Palo Comado and Cornell Rd. (*fide* T. Sagar). "Grassy slopes in southern oak woodland, drainage of upper Malibu Creek" (R/T)
Papaver heterophylla	Wind poppy	N/A	Single old occurrence vic. Reagan Ranch, MCSP; likely extirpated; extant in Simi Hills (*fide* T. Sagar). "Oak woodland, burns" (R/T)
Vicia hassei	Hass's vicia	N/A	Old record from Monte Nido, but possibly confused with V. ludoviciana (*fide* T. Sagar).

Table A2b. List of species considered special-status species of the Coastal Zone in previous reports, but not included by us in this analysis.

This list includes species for which no evidence exists of their occurrence, past or present, in the Coastal Zone, as well as species no longer considered to have special status. SMM = Santa Monica Mountains.

Species	Common name	Status	Distribution in Santa Monica Mountains and vicinity
Macrotus californicus	California Leaf-nosed Bat	CSC	No confirmed records for SMM
Myotis lucifugus occultus	Occult Little Brown Bat	CSC	No confirmed records for SMM
Sorex ornatus salicornicus	Salt Marsh Ornate Shrew	CSC	Restricted to habitat not present in Study Area (saltmarsh)
Reithrodontomys megalotus limicola	Southern Marsh Harvest Mouse	CSC	Restricted to habitat not present in Study Area (saltmarsh)
Pelecanus occidentalis californicus	Brown Pelican	FE/SE	A marine species; may roost on beach near high tide line.
Falco peregrinus anatum	Peregrine Falcon	FE	No nesting records for Study Area; rare transient.
Rallus longirostris levipes	Light-footed Clapper Rail	FE/SE	Restricted to Mugu Lagoon saltmarsh
Sterna antillarum browni	California Least Tern	FE/SE	A marine species; may roost on beach near high tide line.
Empidonax traillii extimus	Southwestern Willow Flycatcher	FE/SE	No nesting records for SMM; rare transient if it occurs at all.
Haliaeetus leucocephalus	Bald Eagle	FT/SE	No modern nesting records for SMM; vagrant.
Charadrius alexandrinus nivosus	Western Snowy Plover	FT	Restricted to shoreline; winter flocks occur away from Study Area (e.g., Malibu Lagoon, Zuma Beach).
Poliptila californica	California Gnatcatcher	FT	Restricted to far western SMM (“Conejo Volcanics”)
Passerculus sandwichensis beldingi	Belding’s Savannah Sparrow	SE	Restricted to Mugu Lagoon saltmarsh; vagrant to Malibu Lagoon
Ixobrychus exilis hesperis	Western Least Bittern	CSC	Vagrant in SMM (e.g., Malibu Lagoon)

Species	Common name	Status	Distribution in Santa Monica Mountains and vicinity
Thalasseus elegans	Elegant Tern	CSC	A marine species; may roost on beach near high tide line
Eremophila alpestris actia	California Horned Lark	CSC	No modern nesting records for SMM; vagrant
Campylorhynchus brunneicapillus	“Coastal” Cactus Wren	CSC	Restricted to far western SMM (“Conejo Volcanics”)
Agelaius tricolor	Tricolored Blackbird	CSC	Vagrant in SMM (e.g., Malibu Lagoon)
Numemius americanus	Long-billed Curlew	CSC	Restricted to shoreline
Riparia riparia	Bank Swallow	ST	No nesting records for SMM; rare transient
Pandion haliaetus	Osprey	WL	No nesting records for SMM; transient
Falco mexicanus	Prairie Falcon	WL	No nesting records for SMM; rare transient
Diadophis punctatus modestus	San Bernardino Ringneck Snake	N/A	No protective status currently; Formerly considered CSC; presumably common in Study Area.
Streptocephauls woottoni	Riverside Fairy Shrimp	FE	Restricted to habitat not present in Study Area (vernal pool)
Panoquina errans	Salt Marsh Skipper	CSC	Restricted to habitat not present in Study Area (saltmarsh)
Brennania belkini Belkins	Dune Tabanid Fly	CSC	Restricted to habitat not present in Study Area (coastal dune)
Cordylanthus maritimus ssp. maritimus	salt marsh bird’s-beak	FE/SE	Restricted to Mugu Lagoon saltmarsh
Astragalus tener var. titi	Coastal dunes milk-vetch	1B.1	Restricted to habitat not present in Study Area (coastal dune)
Astragalus pychostachyus var. lanosissimus	Ventura marsh milk-vetch	1B.1	Restricted to habitat not present in Study Area (alkali flat, saltmarsh)
Dudleya parva	Conejo dudleya	1B.2	Restricted to far western SMM (“Conejo Volcanics”)
Dudleya verityi	Verity’s dudleya	FT/1B.2	Restricted to far western SMM (“Conejo Volcanics”)
Dithyrea maritima	beach spectaclepod	ST/1B.1	No confirmed records for SMM

Species	Common name	Status	Distribution in Santa Monica Mountains and vicinity
Eriogonum crocatum	Conejo buckwheat	SR/1B.2	Restricted to far western SMM ("Conejo Volcanics") and vic. Lake Eleanor (north of Study Area)
Delphinium parryi ssp. blochmaniae	dune larkspur	1B.2	No confirmed records for SMM
Dudleya multicaulis	many-stemmed dudleya	1B.2	No confirmed records for SMM away from Griffith Park
Lasthenia glabrata ssp. coulteri	Coulter's goldfields	1B.1	No confirmed records for SMM
Chorizanthe parryi var. fernandina	San Fernando Valley spineflower	SE/1B.1	Found north of SMM (Simi Hills, Santa Susana Mtns.)
Chorizanthe parryi var. parryi	Parry's spineflower	1B.1	No confirmed records for SMM
Nolina cismontana	California beargrass	1B.2	Found north of SMM (Simi Hills, Santa Susana Mtns.)

Table A3. Special-status Plant Species of the Los Angeles County Coastal Zone.

See Methods for data sources. Preferred habitats information is from Raven and Thompson (1966; "R/T") or McAuley (1996; "M"). "Record" refers to recent specimens, photographs or reliable sight records, not to inclusions in park checklists and other unverified sources.

Species	Common name	Status	Distribution	Preferred habitats in Study Area	Representation on public vs. private lands in Coastal Zone
Abronia maritima	Red sand-verbena	4.2	Single location: Leo Carrillo State Beach (Coastal Strand)	"Local colonies along the coast, coastal strand" (R/T)	Entire known population on public lands (State Beach).
Astragalus brauntonii	Braunton's milkvetch	1B.1; FE	Known from two locations, a ridge within Zuma-Trancas Canyons reserve, and on private lands just west of Pepperdine Univ. (unpublished loc.).	"Very rare; above firebreaks in disturbed soil or on burns" (R/T)	Zuma-Trancas population on public lands; Pepperdine area population on private property; unlikely to be found at additional private parcels if specific (and rare) calcareous soils are not present.
Baccharis malibuensis	Malibu baccharis	1B.1	Known from a small area of the Malibu Creek drainage from vic. Monte Nido west to Tapia Park and north to Stokes Cyn.	?	Due to recent acquisitions, most of known population on public lands. Small population(s) may exist on private parcels in eastern Malibu Creek State Park area.
Baccharis plummerae ssp. plummerae	Plummer's baccharis	4.3	Fairly common in the lower portions of most (all?) coastal canyons, extending inland along the Malibu Creek watershed (e.g., Stunt Ranch).	"Local in shaded canyons usually near the coast" (R/T)	Most occurrences on public lands, extending onto private lands locally; Carbon Cyn. almost entirely on private lands.
Calandrinia breweri	Brewer's redmaids	4.2	Recent records from ridgeline fireroads at Castro Crest and Topanga State Park; several widely-scattered early records.	"Burned or disturbed areas of chaparral, widely scattered" (R/T)	Known population entirely on public lands, but undiscovered populations probably exist scattered on private lands (or may appear after burns).
California macrophylla	Round-leaved filaree	1B.1	Single location: Malibu Creek State Park vic. Reagan Ranch (southeast of Malibou Lake).	"Grasslands and fields" (M)	Single location with a state park; unlikely to be found on private lands unless specific

Species	Common name	Status	Distribution	Preferred habitats in Study Area	Representation on public vs. private lands in Coastal Zone
					(and rare) heavy clay soils are present.
Calochortus catalinae	Catalina mariposa lily	4.2	Fairly common on clay; widely scattered throughout Coastal Zone.	"Very common, mostly in grasslands and coastal sage, and especially conspicuous after fires, at low elevations throughout" (R/T)	Very large populations within public lands, and scattered populations probably on many private parcels.
Calochortus clavatus var. gracilis	Slender mariposa lily	1B.2	Uncommon but widespread throughout Coastal Zone.	"Occasional on dry slopes in open chaparral, coastal sage or oak woodland, away from the coast throughout." (R/T)	Most/all of known populations are on public lands, but probably occur on a small number of private parcels, particularly on volcanic soils.
Calochortus plummerae	Plummer's mariposa lily	1B.2[37]	Fairly common in rocky chaparral and coastal scrub throughout Coastal Zone in rocky chaparral, coastal scrub.	"Scattered and local on rocky slopes at low elevations away from the coast" (R/T)	Very large populations within public lands, and substantial numbers probably also on private lands.
Cercocarpus betuloides var. blancheae	Island mountain-mahogany	4.3	Taxonomy/status unclear; reported from Topanga Cyn. and Decker Rd., but may be more common.	N/A	Unknown; more research needed.
Chamaebatia australis	Southern mountain-misery	4.2	Known (c. 12 individuals) from single site just outside Study Area at Rock Oaks Park (*fide* T. Sagar).	"Mid-elevations with sandstone parent rock…understory of chamise-ceanothus chaparral on north-facing side of ridgeline." (T. Sagar, in litt.)	Single known location on public land.
Deinandra minthornii	Santa Susana tarplant	1B.2	Known from sandstone outcrops at Castro Crest, Charmlee Park, Red Rock/Calabasas Motorway	"Rare in chaparral" (R/T)	Many occurrences on public lands (esp. Castro Crest); Fernwood-Pacific population on private parcel; additional

[37] Plummer's mariposa lily will be moved to Rank 4.2 in the near future (A. Simms, CNPS, via email).

Species	Common name	Status	Distribution	Preferred habitats in Study Area	Representation on public vs. private lands in Coastal Zone
			and Fernwood-Pacific area of Topanga. Apparently planted at lower Solstice Cyn.		populations may be found on private lands if they contain sandstone outcrops.
Dichondra occidentalis	Western dichondra	4.2	Single reported location: Old Topanga Cyn. vic. Hondo Trail (possibly more widespread).	"Locally abundant but quite inconspicuous, on bare slopes after fires" (R/T)	Single known location on private property; additional populations probably occur on both public and private lands if oak woodland present.
Dudleya blochmaniae ssp. blochmaniae	Blochman's dudleya	1B.1	Single location (on shale) within Zuma-Trancas Canyons.	"Stony, open slopes, often in clay" (R/T)	Single known location on public land; unlikely to be found elsewhere but possible on private lands with very thin soils or outcrops.
Dudleya cymosa ssp. marcescens	Marcescent dudleya	FT, 1B.2	Known from three locations (rock outcrops) at Mulholland Hwy. near Yerba Buena Rd., Trancas Canyon, and Malibu Creek State Park.	"Scattered on rocky, north-facing cliffs and slopes, often in shade" (R/T)	Trancas and Malibu Creek locaitons on public lands; unlikely to be found elsewhere but possible on private lands with outcrops and other very steep sites present.
Dudleya cymosa ssp. ovatifolia	Santa Monica Mountains dudleya	FT, 1B.2	Known from two areas (rock outcrops), Topanga Canyon (middle section) and lower Malibu Creek (near tunnel).[38]	"Scattered on rocky, north-facing cliffs and slopes, often in shade" (R/T)	Portion of both populations are on private lands; additional private land occurrences, but likely only on very steep, un-developable sites.
Juglans californica	Southern California black walnut	4.2	Very common throughout, appearing in many different habitats, often as a co-dominant with oaks, toyon, and other trees and large shrubs.	"Throughout the area in oak woodland or in chaparral on north slopes or otherwise moist situations" (R/T)	Very large populations on public lands; also very common private lands.
Lepechinia fragrans	Fragrant pitcher-sage	4.2	Known from two areas of "Conejo Volcanics", one	?	Decker Rd. population on private property; Ventura Co.

[38] A collection from Arroyo Sequit is not believed to be *Dudleya cymosa* ssp. *ovatifolia* (fide T. Sagar).

Species	Common name	Status	Distribution	Preferred habitats in Study Area	Representation on public vs. private lands in Coastal Zone
			along Decker Rd. just west of Malibu Country Club, the other (unpublished) near the L.A.-Ventura Co. line along Little Sycamore Cyn. Rd.		line population on public land; rare enough (at eastern edge of range) that additional populations on private lands unlikely to be found.
Lilium humboldtii ssp. ocellatum	Ocellated Humboldt lily	4.2	Fairly common in shady, mesic canyons throughout Coastal Zone, typically under oaks.	"Locally common along more or less shaded streams in oak woodland away from the immediate coast" (R/T)	Large populations on public lands, and occurs widely on private lands that with larger drainages with at least semi-permanent water.
Navarretia "ojaiensis"	Ojai navarretia (and related species)**	1B.1	Reported from four widely-spaced areas in a band across the upper part of the Coastal Zone, from Old Topanga Cyn. through Stunt Ranch to Trancas Cyn.	?	Small populations on public lands at Stunt Ranch and Trancas Cyn.; known from private lands elsewhere, and likely to be found on additional private parcels with clay soils, particularly near oak woodland.
Pentachaeta lyonii	Lyon's pentachaeta	1B.1; FE/SE	Known from a band of volcanic soils from Stunt Ranch west through Malibu Creek State Park to upper Decker Cyn.	"Heavy soil in grassland, coastal sage scrub" (M)	Populations on public lands at Stunt Ranch/Malibu Creek S.P.; known from private lands elsewhere, and likely to be found on additional private parcels if volcanic soils/outcrops present.
Piperia cooperi	Cooper's rein-orchid	4.2	Recently (2011) discovered at Red Rock Cyn. (near Old Topanga Cyn.) (*fide* T. Sagar).	"Open chamise over sandstone bedrock." (T. Sagar, in litt.)	Sole location is on public land.
Polygala cornuta var. fishiae	Fish's milkwort	4.3	Uncommon in shady canyons throughout Coastal Zone, e.g., Cold Creek/Stunt Ranch, Old Topanga Cyn. (Hondo Creek Trail).	"Rare, on shaded slopes, chaparral or dense southern oak woodland" (R/T)	Most occurrences are on public lands; additional populations likely present on private parcels along shady streams, such as in the Topanga area.
Thelypteris puberula	Sonoran maiden fern	2.2	Known to occur in Encinal	"Rare, in clumps along	Extremely rare locally, and the

Species	Common name	Status	Distribution	Preferred habitats in Study Area	Representation on public vs. private lands in Coastal Zone
var. sonorensis			Cyn.; older (1963) record from nearby Lechusa Cyn.	streams" (R/T)	only likely viable known population is on private land.

* In addition to these listed, a specimen for Davidson's saltbush (*Atriplex serenana* var. *davidsonii*; CNPS 1B.2) purportedly from vic. Las Virgenes Cyn. Rd. near Mulholland Hwy., is almost certainly in error (*fide* A. Sanders, UC Riverside Herbarium). Several other special-status plant species are known from the City of Malibu, just south of the Coastal Zone, but have not been included here.

** *Navarretia ojaiensis*, described formally in 2007, likely pertains to both white- and blue-flowered taxa (*fide* C. Wishner) that occur on clay soil in and around oak woodland in the western Santa Monica Mountains and at low elevations in the southern San Raphael Mountains. The relationship between these plants and those that have been identified as *Navarretia pubescens*, *N. jaredii*, and *N. mitracarpa* needs clarification, so we feel it is appropriate to simply call attention to all "odd *Navarretia*" in the range (i.e., those other than the widespread and distinctive *N. hamata*).

Table A4. "Locally uncommon plants" of the Los Angeles County Coastal Zone.

MCSP = Malibu Creek State Park. Preferred habitats information is from Raven and Thompson (1966; "R/T") or McAuley (1996; "M"). Main sources of information listed in Methods; location data also from interviews with local botanists (T. Sagar, C. Wishner, D. Koutnik).

Species	Occurrence in Coastal Zone	Preferred habitats in Study Area	Representation on public vs. private lands in Coastal Zone
Acer macrophyllum	Small populations in several major canyons (Malibu, Topanga, etc.)	"Streams and in steep side canyons; riparian woodland" (R/T)	Most of population probably on public lands (along protected canyons).
Allium praecox	Known from Red Rock Cyn., Topanga area (T. Sagar).	?	Single population may be on private land, or nearby.
Amorpha californica	Uncommon but widely-distributed in oak woodland and other shady sites.	"Southern oak woodland on the north side of the western half of the range" (R/T)	Large populations on public lands, scattered occurrences likely on private lands.

Amsinckia menziesii var. menziesii	Known from MCSP (Reagan Meadow); probably more widespread but not often separated from related forms (*A. m*. var. *intermedius*) in botanical surveys.	"Grassy hillsides in southern oak woodland" (R/T)	Sole population on public lands.
Apocynum cannabinum	Known from MCSP (two populations); Cold Creek Reserve	"Tangled vegetation along lower Malibu Creek" (R/T)	All known occurrences on public lands; may be discovered on private lands locally (along streams, e.g., Carbon Cyn.).
Aster chilensis	Known from upper Ramirez Cyn., just east of Kanan Rd. (C. Wishner)	?	Sole population on private land.
Aster lanceolatus ssp. hesperius	Known from MCSP (two populations)	?	Both populations on public land.
Berberis pinnata ssp. pinnata	Newton Cyn./ "Falls"; old record from Malibu Canyon	"Uncommon, in deep shade" (R/T)	Sole known occurrence on public land.
Boykinia rotundifolia	Known from single site in Steep Hill Cyn. (former "Rancho Malibu" property)	"Moist soil near streams" (R/T)	Sole known occurrence on private land; may be discovered in Encinal/Escondido cyns. in same area.
Species	**Occurrence in Coastal Zone**	**Preferred habitats in Study Area**	**Representation on public vs. private lands in Coastal Zone**
Brodiaea terrestris ssp. kernensis	Two occurrences, MCSP (Reagan Meadow) and Stunt Ranch.	"Rare, open clay flats in the central part of the mountains away from the coast" (R/T)	Both occurrences on public lands; may be discovered on private lands with heavy clay soils.
Calochortus albus	Scattered populations throughout Study Area, typically in openings in oak woodland and mesic chaparral.	"Locally in moist places, usually common in deep shade in southern oak woodland, north slope of central part of range" (R/T)	Known from both public and private lands, but probably not highly dependent on the latter.

Calochortus splendens	Scattered populations throughout Study Area, typically in arid chaparral (esp. in "Badlands" northeast of Gillette Ranch).	"Local on brushy slopes" (R/T)	Known from both public and private lands; "Badlands" (private parcels) may support large population.
Calystegia collina ssp. venusta	Known from single site in MCSP (Crags Rd.)	?	Sole known occurrence on public land.
Calystegia purpurata ssp. purpurata	Known from Conejo Volcanics in northwest, e.g., Yerba Buena Rd. at Mulholland Hwy. (CCH), vic. Malibu Country Club (C. Wishner).	?	Both occurrences on private lands.
Calystegia soldanella	Early (1954) record from "Sequit Point" (now Leo Carrillo State Beach).	"Local, coastal strand; Point Dume and westward" (R/T)	If extant, sole occurrence on public land.
Carex barbarae	Several locations within MCSP; also known from Cold Creek drainage just southeast of Mulholland (east of Gillette).	"Along streams" (R/T)	All known occurrences on public lands; may be discovered on private lands locally (wet areas).
Carex globosa	Known only from Castro Crest	?	Sole known occurrence on public land; may be discovered on sandstone outcrops on private lands.
Carex spissa	Widely-scattered occurrences (Las Flores Cr., Cold Creek)	"Local in shaded places along streams at low elevations" (R/T)	Known from both public and private lands; likely to occur on private lands (seeps).
Carex triquetra	Known only from Fernwood area of Topanga, on sandstone outcrops.	"Common on dry slopes in chaparral, up to 1700 ft elevation" (R/T)	Known only from private land, but may occur on public lands elsewhere.
Species	**Occurrence in Coastal Zone**	**Preferred habitats in Study Area**	**Representation on public vs. private lands in Coastal Zone**
Claytonia gypsophiloides	Known only from MCSP (Lost Cabin Tr.)	?	Sole known occurrence on public land.

Clinopodium douglasii	Single known location in lower Rustic Cyn. east of Study Area (Pacific Palisades area), so could be discovered.	"Southern oak woodland" (M)	N/A
Collinsia parryi	Known from northeast of Gillette Ranch.	"Chaparral, particularly burned or disturbed areas" (M)	Occurs on public lands, but more occurrences possible in "Badlands" area of private land.
Comarostaphylis diversifolia ssp. planifolia	Known from Tapia Park (Backbone Tr.)	"Rare, chaparral and southern oak woodland" (R/T)	Sole known occurrence on public land.
Coreopsis bigelovii	Known from MCSP (vic. Bulldog Fire Rd.); old record from Tapia Park.	"Rare in grassland and open southern oak woodland from Malibu Creek eastward, at relatively low elevations away from the coast" (R/T)	Sole known occurrence on public land.
Leptosyne californica	Known only from MCSP (Lost Cabin Tr.)	"Compact gravelly volcanic soil in an opening in chamise-bigpod ceanothus chaparral" (T. Sagar, in litt.)	Sole known occurrence on public land.
Cornus glabrata	Known from MCSP and just outside Study Area at Seminole Hot Springs where probably relictual (flowers, but fruits fail to mature).	Found in cool drainages within canyons.	Sole known occurrence within Study Area is on public land.
Eriastrum densifolium ssp. elongatum	Known from Castro Crest and at "Badlands" northeast of Gillette Ranch.	"Open sandy soil, rare" (R/T); also occurs on volcanic outcrops with a "thin veneer of sandy soil"	Sole known occurrence on public land.
Eriogonum cithariforme var. agninum	Known from northeast of Gillette Ranch.	"Dry slopes…chaparral" (R/T; not in "disturbed fields", fide T. Sagar)	Occurs on public lands, but more occurrences possible in "Badlands" area of private land and on outcrops elsewhere.
Eriogonum wrightii var. membranaceum	Known from several sandstone outcrop areas (e.g., Castro Crest, Hepatic Gulch).	"Forming large mats on bare weathered sandstone cliffs" (R/T)	Occurs on public lands, but more occurrences possible in "Badlands" area of private land and on outcrops elsewhere.

Species	Occurrence in Coastal Zone	Preferred habitats in Study Area	Representation on public vs. private lands in Coastal Zone
Githopsis diffusa ssp. diffusa	Known from Castro Crest, Solstice Cyn. and northeast of Gillette Ranch.	"Shaded banks" (R/T)	Occurs on public lands, but more occurrences possible.
Glycyrrhiza lepidota	Known only from MCSP.	"Rare; streamside thicket, Malibu Creek State Park" (R/T)	Sole known occurrence on public land; unlikely elsewhere due to localized distribution.
Helenium puberulum	Known from creek area of MCSP, Topanga Cyn.	"Shaded wet places along creeks, intermittent streambed" (R/T)	All known occurrences on public lands; may be discovered on private lands locally (wet areas).
Heterocodon rariflorum	Known currently from upper Solstice Cyn. below Castro Crest (fide T. Sagar).	"Partially shaded opening in chaparral" (T. Sagar, in litt.)	Sole known occurrence on public land.
Heterotheca sessiflora ssp. fastigiata	Known from several locations within MCSP.	"Dry slopes and intermittent streams in coastal sage scrub and chaparral" (R/T)	Sole known occurrence on public land, but could be found in arid, rocky scrub on private lands.
Hieracium argutum	Known from Castro Crest, Backbone Trail vic. Tapia Park (also Santa Ynez Cyn. east of Study Area).	"Rare; along east ridge of Castro Peak" (R/T)	Known occurrences on public lands; unlikely to occur on private lands or at lower elevations (relict/disjunct occurrence).
Horkelia cuneata ssp. cuneata	Known only from Charmlee Park.	"Sandy flats or open brush covered slopes" (R/T)	Sole known occurrence on public land; a rare plant unlikely to be found elsewhere.
Iva axillaris ssp. robustior	Known from MCSP and Gillette Ranch.	"Dry, weedy flats near the entrance to Century Ranch (= MCSP)" (R/T)	Known occurrences on public lands; unlikely to be found elsewhere.
Juncus patens/textilis	Known from Hondo Cyn. and vic. Red Rock Park (Old Topanga).	"Seasonally moist open hillsides, colonial and widely scattered" (R/T)	Both occurrences on/near private lands.

Koeleria macrantha	Scattered records throughout Study Area.	"Occasional in southern oak woodland, northern slope of the western half of the mountains" (R/T)	Probably occurs on both public and private land, but is nowhere common.
Species	**Occurrence in Coastal Zone**	**Preferred habitats in Study Area**	**Representation on public vs. private lands in Coastal Zone**
Layia platyglossa	Known from Upper Malibu Springs Trail.	"Common on sandy coastal flats" (R/T)	Sole occurrence on public land; may occur on private lands.
Elymus triticoides	Known from Stunt Ranch.	"Moist areas with clay soils" (T. Sagar, in litt.)	Sole occurrence on public land; may occur locally on private land, e.g., in Old Topanga/Red Rock area.
Lobelia dunnii var. serrata	Known from Malibu Cyn. below Rindge Dam.	"Shady canyons near water, uncommon" (R/T)	Sole known occurrence on public land; a rare plant unlikely to be found elsewhere.
Lotus hamatus	Known from vic. Winter Cyn. adjacent to Pepperdine Univ.	"Coastal sage scrub, very rare" (R/T)	Sole known occurrence on private land; may occur elsewhere on private lands on sandy soils.
Melica californica	Five locations in band from "Badlands"/Monte Nido west to Decker Cyn. Rd.	Coastal sage scrub (T. Sagar, in litt.)	Known from both public and private lands, and likely to be found on more private lands.
Mimulus floribundus	Four known occurrences, all on public lands.	"Rare, sandy flats along streams" (R/T)	All known occurrences on public lands; a rare plant unlikely, but possible, on private lands.
Mimulus pilosus	Known from northeast of Gillette Ranch ("Badlands"); older records for Trancas (Rattlesnake Cyn.) and "summit Decker Rd."	"Moist areas in southern oak woodland and chaparral. Rare in the western half of the mountains away from the coast; more common after fire" (R/T)	All known occurrences on public lands; a rare plant unlikely, but possible, on private lands.
Monardella hypoleuca ssp. hypoleuca	Known from single occurrence at Stunt Ranch (also in Santa Ynez Cyn. east of Study Area).	"under oaks" (R/T)	Sole occurrence is on public lands.

Muhlenbergia rigens	Found widely, e.g., in scrub near Decker Rd. and Mulholland Hwy.	"Rare and local in open ground, often under oaks" (R/T)	Found on both public and private lands.
Nemacladus ramosissimus	"Upper Las Virgnenes" (near MCSP?); also on NPS lands w. of Camp Shalom (Arroyo Sequit area); old record from Monte Nido.	"Dry sandy places under shrubs. Rare" (R/T)	Known from one site, on public land; could occur on private lands given proper soil type.
Species	**Occurrence in Coastal Zone**	**Preferred habitats in Study Area**	**Representation on public vs. private lands in Coastal Zone**
Nicotiana clevelandii	Known from "Gillette Knoll" and "lower Topanga State Beach" (?).	?	Known from two locations, both on public lands; could occur on private lands given proper soil type.
Nicotiana quadrivalvis	Several scattered records; probably not particularly rare.	"Rare in disturbed soil or burns" (R/T)	Found and likely to be found on both public and private lands.
Notholeana californica	Known from NE Gillette Ranch NE (vic. "Badlands"); "City of Malibu west of Decker" (1966); "Las Virgenes Cyn.".	"Rare, on rocky slopes under brush" (R/T)	Known from one site, on public land.
Orobanche uniflora	East of Tapia (Backbone Tr.) and MCSP.	"Thin soil over bedrock in openings in ceanothus chaparral (T. Sagar, in litt.)	Known from two locations, on public lands.
Phacelia brachyloba	Several records, widely-scattered; a fire-follower.	"Open areas in chaparral, recently burned areas" (R/T)	Probably occurs uncommonly on both public and private lands.
Pickeringia montana var. montana	Known from scattered sites at higher elevations: Topanga fireroad; Castro Crest, Saddle Peak Rd. and lower Zuma Cyn.	"Chaparral in the western part of the mountains above 1000 ft" (R/T)	Occurs on both public and private lands, but most of habitat (interior chaparral) on public lands.
Piperia unalascensis	Known from four areas near center of Study Area.	"Recently burned southern oak woodland" (R/T)	Known from public lands, but possible on private lands.

Platystemon californicus	Single known location in Zuma-Trancas canyons.	"Grassy areas" (R/T)	Known with certainty from one site, on public land; may occur more widely, possibly after fires (including on private lands).
Quercus wislizeni var. frutescens	Found only along Castro Crest/Castro Peak, from upper Zuma Cyn./Zuma Ridge to Saddle Peak.	"North-facing slopes" (T. Sagar, in litt.)	Most locations on public lands; possibly at a small number of private parcels in Saddle Peak area.
Rorippa curvisiliqua	Known only from Tapia Park	"Wet places" (R/T)	Known from one site, on public land; may occur on private lands along streams.
Species	**Occurrence in Coastal Zone**	**Preferred habitats in Study Area**	**Representation on public vs. private lands in Coastal Zone**
Rupertia physodes	Known from two locations within MCSP.	"Rare and colonial in dry places protected by brush at low elevations away from the coast" (R/T)	Apparent sole population is on public lands; a rare plant unlikely to be found on private lands, but possible in Monte Nido area and similar sites.
Samolus parviflorus	Known from single sites at Leo Carrillo State Beach and lower Malibu Canyon.	"Wet places" (R/T)	Two known occurrences on public lands; unlikely to be found on private land.
Sedum spathulifolium	Known from a cliff face within MCSP; possibly introduced at site where found (fide T. Sagar)	North-facing, partially-shaded volcanic outcroppings in openings in ceanothus chaparral (T. Sagar, in litt.)	Apparent sole population is on public lands; a rare plant unlikely to be found on private lands.
Senecio breweri	Known from Reagan Ranch area of MCSP.	"Shaded slopes in southern oak woodland; upper drainage of Malibu Creek" (R/T)	Apparent sole population is on public lands; a rare plant unlikely to be found on private lands.
Silene verecunda	Known only from Castro Crest	"Rare; sandstone outcrops, ridge east of Castro Peak" (R/T)	Apparent sole population is on public lands; a rare plant unlikely to be found on private lands.

Solidago confinis	Known only from lower Malibu Cyn.	?	Apparent sole population is on public lands; a rare plant unlikely to be found on private lands.
Thysanocarpus conchuliferus	Known only from single occurrence at MCSP.	"Thin soil in rocky areas in southern oak woodland and chaparral" (R/T)	Apparent sole population is on public lands; a rare plant unlikely to be found on private lands.
Triodanis biflora	Known from NE of Gillette Ranch ("Badlands") and upper Solstice Cyn. below Castro Crest.	"Among grasses and forbs in openings in ceanothus-chamise chaparral" (T. Sagar, in litt.)	Two known locations are both on public lands, but possible on private lands in Badlands area.
Vicia ludoviciana	Known only from upper Solstice Cyn. below Castro Crest.	"Oak woodland on bank of seasonal creek" (T. Sagar, in litt.)	Apparent sole population is on public lands; a rare plant unlikely to be found on private lands
Species	**Occurrence in Coastal Zone**	**Preferred habitats in Study Area**	**Representation on public vs. private lands in Coastal Zone**
Festuca octoflora	Several scattered records; probably not particularly rare.	"At Palo Comado (Cyn.), the plants occur in thin, sandy soil over sandstone parent rock in open chamise chaparral" (T. Sagar, in litt.)	Likely large populations on public lands, but possible on private lands.
Woodwardia fimbriata	Known from several deep, shady canyon sites, most on public lands.	"Local along streams in partial shade" (R/T)	Several robust populations on public lands; probably in a small number of canyon sites on private lands (e.g., Encinal Cyn.).

Table A5. "Stewardship Species" of Study Area.

(see text for explanation of this designation)

Species	Common name	Distribution and habitat	Representation on public vs. private lands in Coastal Zone
BIRDS			
Catherpes mexicanus	Canyon Wren	Restricted to rock outcrops (throughout)	Mainly on public lands (largest, most distinctive outcrops are found here) but also locally on private lands.
Colaptes auratus	Northern Flicker	Breeding resident in mature woodland, especially oak-sycamore.	Large areas of habitat in public ownership (e.g., Malibu Creek State Park) but also occurs locally on private parcels.
Spinus lawrencei	Lawrence's Goldfinch	Fairly common along Castro Crest and inland, especially in chamise chaparral.	Large areas of habitat in public ownership (e.g., Malibu Creek State Park), but probably occurs irregularly on private parcels.
Tachycineta thalassina	Violet-green Swallow	Breeds on rock outcrops (throughout)	Mainly on public lands (largest, most distinctive outcrops are found here) but also locally on private lands.
REPTILES/AMPHIBIANS			
Aneides lugubris	Arboreal salamander	Very poorly-known; two old specimens from Escondido Cyn., Tapia Park; probably local in oak woodland and along wooded canyons, mesic chaparral.	Unknown, but likely secure in large public reserves if present (e.g., Malibu Creek State Park).
Bufo californicus	Western toad	Known from Topanga area and Corral Cyn., and breeds in seasonal pond at Rocky Oaks Park just north of CZ boundary and probably elsewhere with standing water (*fide* K. Delaney); apparently absent in most canyons (NPS data; R. Dagit, in litt.).	Probably found equally in public vs. private lands.
Ensatina eschscholtzii	Monterey ensatina	Very poorly-known; known from oak woodland of Topanga area (including Hondo Cyn., fide R. Dagit); two specimens from Topanga area in 1979; probably locally distributed throughout study area in oak woodland and along wooded canyons, mesic chaparral.	Unknown, but likely secure in large public reserves where present (e.g., Topanga State Park).

Species	Common name	Distribution and habitat	Representation on public vs. private lands in Coastal Zone
Hyla cadaverina	California treefrog	Present in most canyons in Study Area.	Large populations on public lands; probably occurs locally on private lands, in deep canyons with year-round water (e.g., Encinal, Escondido).
MAMMALS			
Felis concolor	Mountain lion	Ranges widely in Study Area, but appeasr to prefer mesic canyons and wooded areas, with apparent areas of concentrated activity/time, including Arroyo Sequit; Zuma-Trancas canyons; Escondido Cyn.; MCSP; Upper Puerco Cyn.; Las Flores Cyn.; Stunt Ranch; and Tuna Cyn.	Ranges widely onto both public and private lands.
Lynx rufus	Bobcat	Apparently still numerous throughout Study Area (L. Klein, UCLA, unpubl. data).	Presumably occurs on both public and private lands.
Odecoileus hemionus	Mule deer	Presumably similar to Mountain Lion (main prey).	Ranges widely onto both public and private lands.
Sciurus griseus	Western gray squirrel	Widespread in wooded canyons and adjacent slopes. Extirpated from numerous historical sites in lowland southern California.	Occurs on both public and private lands, including rural residential areas (e.g., Monte Nido).
Sylvilagus bachmani	Brush rabbit	Poorly known; "Specimen trapped and identified at Castro Crest, Dec. 1988" (NPS archives); early specimens from Topanga Cyn. and Carbon Cyn. Apparently extirpated from Griffith Park.	Possibly widespread in dense chaparral (common at Will Rogers State Park, to the east; D.S. Cooper, pers. obs.), but few records.
INVERTEBRATES			
Adelpha californica	California sister	Very common throughout, near coast live oak (*Quercus agrifolia*).	Large populations present on public lands and locally on private lands.
Calephelis nemesis	Fatal metalmark	Recent photographs from MCSP and Solstice Cyn. (www.socalbutterflies.com); 3 records during 1965-66 (Cold Creek, Saddle Peak); feeds on native asters; nearly extirpated from Griffith Park.	Unknown; possibly widespread in a variety of habitats so likely occurs on both public and private lands.
Chlosyne gabbii gabbii	Gabb's checkerspot	Recent photographs from MCSP (www.socalbutterflies.com); 7 records during 1965-66 (Cold Creek, Castro Peak, Topanga, etc.); feeds on native asters; extirpated from Griffith Park.	Unknown; possibly widespread in a variety of habitats so likely occurs on both public and private lands.
Coenonympha tullia	California ringlet	Very common throughout, near native grasses (esp.	Large populations present on public

Species	Common name	Distribution and habitat	Representation on public vs. private lands in Coastal Zone
californica		*Stipa* spp.); extirpated from Griffith Park.	lands and locally on private lands.
Euphilotes bernardino ("Santa Monica Mountains segment")	"Ashy buckwheat blue"	An undescribed taxon (unknown if distinct/valid) that uses *Eriogonum cinereum*) as a foodplant , presumably occurs widely on lower, coastal-facing slopes.	Large populations presumably present on public lands and locally on private lands.
Euphydryas chalcedona	Chalcedon's checkerspot	Common throughout, near California buckwheat (*Eriogonum fasciculatum*); extirpated from Griffith Park.	Large populations present on public lands and locally on private lands.
Aphonopelmus spp.	Tarantula	Both species (*A. eutylenum*) and *A. reversum*) "uncommon at best and records of sightings in Topanga at Trippett Ranch, along the Tuna Canyon motorway, Saddle Peak motorway and Calabasas motorway have been declining over the past 25 years (R. Dagit, *in litt.*).	Presumably still widely distributed (if localized and rare now). Often found during pitfall trapping and not through "casual observation".
Bothriocyrtum califonicum	California trapdoor spider	Poorly-known, but presumably locally common in areas of clay soil.	Unknown

Table A6. Table of breeding birds from survey blocks in Santa Monica Mountains Coastal Zone of Los Angeles County used for the Los Angeles County Breeding Bird Atlas, 1995-1999 (see text for description). Breeding codes are standard for atlas projects, e.g., confirmed (CO), probable (PR) and possible (PO) breeding. Latin names omitted for brevity. Data courtesy of Los Angeles Audubon Society and Museum of Natural History, Los Angeles County.

Species	Block[1]												
	TOP 1	TOP 3	MAL 2	MAL 1	MAL 4	MAL 3	MAL 5	POI 1	POI 2	POI 3	POI 4	TRI 2	TRI 4
Total # PO/PR/CO	58	58	60	68	74	55	60	60	75	60	59	43	74
Canada Goose									CO				
Wood Duck					CO	CO			CO				
Gadwall					PO				PR				
Mallard					CO	CO	CO	CO	CO				CO
Pied-billed Grebe					CO			PO	CO				
California Quail	PR	CO	CO	CO	CO	CO	PR	CO	CO	CO	CO	CO	CO
Mountain Quail									PR				
Great Blue Heron					CO	CO			OB				OB
Green Heron				CO		PO			PR				
Black-cr. Night-Heron					OB				OB				
Turkey Vulture		OB	OB	OB	OB						OB		PR
White-tailed Kite	CO			CO			CO			PO			PO
Golden Eagle[2]				PR									
Cooper's Hawk	CO	PO	CO	PO	CO		PR	PO	CO	CO	PO		CO
Red-shouldered Hawk	CO	CO	CO	CO	CO	PR	PO	PR	CO	CO	PO	PR	PR
Red-tailed Hawk	PR	CO	PO	CO	CO	CO	CO	CO	CO	PO	CO	CO	CO
American Coot									CO				CO

[1] Blocks are based on the following USGS topographical maps: Topanga, Malibu Beach, Point Dume, and Triunfo Pass. Major features of each include: TOP 1 (Topanga State Park), TOP 3 (Topanga State Park, Tuna Cyn., Santa Ynez Cyn.), MAL 2 (Topanga State Park, Stunt Ranch, Cold Creek); MAL 1 (Malibu Creek State Park); MAL 4 (Las Flores Cyn., Piuma Rd., Carbon Cyn., Monte Nido, Malibu Lagoon); MAL 3 (Monte Nido, Tapia State Park); MAL 5 (Pepperdine U., Malibu Bluffs, Solstice Cyn.); POI 1 (Malibu C.C., Vera Cyn., Rocky Oaks Park); POI 2 (Castro Crest, Malibou Lk., Paramount Ranch, Triunfo Cyn.); POI 3 (Encinal Cyn., Zuma Cyn., Trancas Cyn.); POI 4 (Latigo Cyn., Solstice Cyn., Castro Crest, Escondido Cyn.); TRI 2 (Arroyo Sequit, Yerba Buena Rd.); TRI 4 (Arroyo Sequit, Nicholas Flat, Charmlee Park, Decker Canyon).

[2] Presumed extirpated as a breeder (no recent confirmation of nesting).

Killdeer		PR		PR	CO	PR		PO	PR				CO
Species	Block												
	TOP 1	TOP 3	MAL 2	MAL 1	MAL 4	MAL 3	MAL 5	POI 1	POI 2	POI 3	POI 4	TRI 2	TRI 4
Band-tailed Pigeon	CO	OB											
Mourning Dove	PR	CO	PR	CO	PR	PR	CO	CO	PR	PR	PR	CO	PR
Greater Roadrunner	PO	PO		PR	PR				PO	PO	CO		CO
Barn Owl	CO			CO	PO								PR
Western Screech-Owl	CO	PR	PO	CO	PR	PO	PO	PO	PR	PR	PR	PO	PO
Great Horned Owl	CO	PR	PR	CO	PR	PO	PR	CO	PR	PR	PO	PO	PR
Common Poorwill	PR	PR	PR	PO	PO	PR		PO	PR	PR	PR	PR	PR
White-throated Swift	CO	CO	OB		CO	PR	CO		PR	OB			OB
Black-chinned Hummingbird	CO	CO	CO	PO	PR	CO	PO	PO	CO	CO	CO	PR	CO
Anna's Hummingbird	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO
Costa's Hummingbird	CO	CO	CO	CO	PO		PR	PO	PR	PR	PR	CO	CO
Allen's Hummingbird		PO		CO	CO		CO	PO	PO	PO	CO		PR
Belted Kingfisher[2]		PO			PR	PR			CO				OB
Acorn Woodpecker	CO		PR	PR	CO	PR	PO	PO	CO	PO	PO		PO
Nuttall's Woodpecker	CO	CO	CO	CO	CO	PO	PR	CO	CO	CO	CO	CO	CO
Downy Woodpecker	CO	PO	PO	PO			PO		PR	CO			PR
Northern Flicker	PR	PR	PR		PR	PR	PR	PO	PR	CO	CO	CO	CO
American Kestrel	PO		CO		CO	PO	CO		CO		OB	CO	CO
Olive-sided Flycatcher[2]		OB			CO			PR			CO		
Western Wood-Pewee	PO	OB	PO	OB	CO		PO	PO	PO	CO	CO		CO
Pacific-slope Flycatcher	CO	CO	CO	PR	CO		CO	CO	CO	CO	CO	PR	CO
Black Phoebe	CO	CO	CO	CO	CO	CO	CO	CO	CO	PO	CO	CO	CO
Say's Phoebe													
Ash-throated Flycatcher	CO	PR	PR	CO	CO	PR	PO	CO	PR	PR	CO	PR	PR
Cassin's Kingbird													
Western Kingbird			PO	PR	PO		PR		PR				CO
Loggerhead Shrike[2]							PO				PO		

Hutton's Vireo	CO	CO	CO	PO			PO	CO	PR	PR	CO	CO	CO
Species	Block												
	TOP 1	TOP 3	MAL 2	MAL 1	MAL 4	MAL 3	MAL 5	POI 1	POI 2	POI 3	POI 4	TRI 2	TRI 4
Warbling Vireo	PO		PO	CO	PO		PR	PR			CO	PO	PR
Western Scrub-Jay	CO	CO	CO	CO	CO	CO	CO	CO	PR	CO	CO	CO	CO
American Crow	CO	CO	CO	CO	CO	CO	CO	CO	CO	PR	PO	CO	CO
Common Raven	CO	PR	CO	CO	CO	PR	CO	CO	CO	CO	CO	CO	CO
Violet-green Swallow	PO	CO		PR	CP	CO		PO	CO	PR			CO
Northern Rough-winged Swallow	CO	CO	CO	PO	CO	CO	CO	PO	CO	CO		PR	CO
Barn Swallow					CO		PO						CO
Cliff Swallow	CO	CO	CO	CO	CO	CO	CO	CO	CO	PR	PO	CO	CO
Oak Titmouse	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO
Bushtit	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	PO	CO
White-breasted Nuthatch				CO		PR			PO				
Rock Wren				PO									PR
Canyon Wren	CO	CO	PR	PO	CO	CO	PR	PR	PR	PR	PR	PR	CO
Bewick's Wren	PR	CO	CO	CO	CO	PO	CO	PR	CO	PR	CO	CO	CO
House Wren	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO
Marsh Wren[2]								PR					CO
Blue-gray Gnatcatcher	CO	PR	CO	CO	CO	PR	PO	PO	PR	PR	PR	PR	CO
Wrentit	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO
Western Bluebird			CO	CO	PO	PO		PR	CO				
American Robin	PR	PO	PO	CO	CO		CO	CO	CO	CO	CO		PR
California Thrasher	PR	CO	CO	PO	PR	CO	PR	CO	CO	CO	PR	CO	CO
Species													
Northern Mockingbird	PO	CO	CO	PR	PR	CO	CO	PO	PO	PO	CO	PR	CO
Phainopepla	CO	PR	CO	PR	CO	PO	PO	PO	PR	CO	CO	PO	CO
Orange-crowned Warbler	CO	PR	PO	PR	CO	CO	CO	CO	PR	CO	CO	CO	PR
Yellow Warbler				PO	PO								
Common Yellowthroat		PR	PO	PO	PR	PO	CO	PR	PR	PR	PR		CO
Spotted Towhee	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	PR	CO	CO

Rufous-crowned Sparrow	CO	CO	CO	PO	PR		CO		PO	PR	PR		CO
California Towhee	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO
Species	Block												
	TOP 1	TOP 3	MAL 2	MAL 1	MAL 4	MAL 3	MAL 5	POI 1	POI 2	POI 3	POI 4	TRI 2	TRI 4
Black-chinned Sparrow			PO		PR						PR		
Lark Sparrow	CO	CO	CO			PR			CO	CO			CO
Bell's Sparrow			PR							CO	CO		PR
Song Sparrow	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	PO	CO
Dark-eyed Junco	CO				PR			CO		CO	PR		
Western Tanager									PO				
Black-headed Grosbeak	PR	CO	CO	PR	CO	CO	PR	PR	CO	PR	CO	CO	CO
Blue Grosbeak				PO									
Lazuli Bunting	CO	PR	CO	CO	CO				PR	PR			CO
Red-winged Blackbird				PR	PR	CO	CO	PR	CO	PR		CO	CO
Brewer's Blackbird		CO	PO	PO	CO	PR	CO	PO	PR		PO		CO
Great-tailed Grackle					PO								
Brown-headed Cowbird	PR		PO	CO	PR	CO	CO	PO	CO	PR	CO	PO	PR
Hooded Oriole	CP	PO	CO	CO	CO	CO	PR	PO	CO	PR	CO	PO	CO
Bullock's Oriole	CO	PO	PO	CO	CO	PO	PO	CO	CO	CO	PR		CO
Purple Finch				PO				CO	OB	CO	PR		PR
House Finch	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	PR	CO	CO
Lesser Goldfinch	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO	CO
Lawrence's Goldfinch			PO	PR			PR	PR	PO	PO	CO		PO
American Goldfinch					PO	PO	PO						PR
Introduced Species: *Common Peafowl*									*CO*				
Black-hooded Parakeet		*PO*			*PO*	*PR*	*PR*				*PR*		
Spotted Dove		*PO*			*PO*								
Rock Pigeon	*PO*	*CO*	*PO*	*PO*	*CO*		*CO*	*PO*	*PR*		*PO*	*PR*	
European Starling	*CO*	*CO*	*CO*	*CO*	*PO*	*CO*	*CO*	*CO*	*PR*	*CO*	*CO*	*CO*	*CO*
House Sparrow	*CO*	*CO*	*PO*		*CO*		*CO*		*PO*		*PO*		*CO*
Orange Bishop					*PO*								

Table A7. "ESHA Triggers".

The following species are either believed to be absent here (but in some cases present elsewhere in the region), or they are very rare and likely threatened in the region, often (particularly in the case of plants) restricted to private parcels in the Study Area. If found to be resident during a site survey or biological assessment, they could qualify the habitat area where found as ESHA. Please refer to other tables for additional information.

Species	**Common name**
ANIMALS	
Mammals	
(several)	Roosting bats (natural substrate only)
Bassariscus astutus	Ringtail
Dipodomys agilis	Pacific kangaroo-rat
Lepus californicus bennettii	San Diego black-tailed jackrabbit
Spilogale gracilis	Spotted skunk
Taxidea taxus	American badger
Reptiles/Amphibians	
Coluber constrictor	Yellow-bellied racer
Emys marmorata	Southwestern pond turtle
Lampropeltis zonata	San Diego mountain kingsnake
Rana draytonii	California red-legged frog
Salvadora hexalepis virgultea	Coast patchnose snake
Taricha torosa	Coast range newt
Thamnophis sirtalis	California red-sided ("South Coast") garter-snake
Fish	
Entosphenus tridentatus	Pacific lamprey
Birds	
Agelaius tricolor	Tricolored Blackbird
Ammodrammus savannarum (nesting)	Grasshopper Sparrow
Artemisiospiza belli	Bell's Sparrow

Species	Common name
Aquila chrysaetos (nesting)	Golden Eagle
Asio otus	Long-eared Owl
Athene cunnicularia	Burrowing Owl
Campylorhynchus brunneicapillus	“Coastal” Cactus Wren
Cathartes aura (nesting)	Turkey Vulture
Catharus ustulatus (nesting)	Swainson’s Thrush
Circus cyaneus (wintering)	Northern Harrier
Cistothorus palustris clarkae (nesting)	Clark’s marsh wren
Elanus leucurus	White-tailed Kite
Empidonax traillii extimus (nesting)	Southwestern Willow Flycatcher
Eremophila alpestris actia (nesting)	California Horned Lark
Falco mexicanus (nesting)	Prairie Falcon
Geococcyx californianus	Greater Roadrunner
Icteria virens (nesting)	Yellow-breasted Chat
Lanius ludovicianus (nesting)	Loggerhead Shrike
Megaceryle alcyon (nesting)	Belted Kingfisher
Oreortyx pictus	Mountain Quail
Picoides villosus (nesting)	Hairy woodpecker
Poliptila californica	California Gnatcatcher
Sturnella neglecta (nesting)	Western Meadowlark
Vireo bellii pusillus (nesting)	Least Bell’s Vireo
Insects	
Euphydryas editha quino	Quino checkerspot
Lycaena arota nubila	Cloudy tailed-copper
Lycaena gorgon gorgon	Gorgon Copper
Polygonia satyrus satyrus	Satyr anglewing

Species	Common name
Satyrium auretorum fumosum	Santa Monica Mountains hairstreak
Speyeria callippe comstocki	Comstock’s fritillary
PLANTS	
Allium praecox	Early onion
Aster chilensis	(aster)
Astragalus brauntonii	Braunton's milkvetch
Baccharis malibuensis	Malibu baccharis
Boykinia rotundifolia	Round-leaved boykinia
California macrophylla	Round-leaved filaree
Calochortus clavatus var. gracilis	Slender mariposa lily
Calystegia purpurata ssp. purpurata	(morning-glory)
Carex triquetra	(sedge)
Caulanthus heterophyllus	Slender-pod jewelflower
Deinandra minthornii	Santa Susana tarplant
Dudleya abramsii ssp. parva	Conejo dudleya
Dudleya blochmaniae ssp. blochmaniae	Blochman's dudleya
Dudleya cymosa ssp. marescens	Marescent dudleya
Dudleya cymosa ssp. ovatifolia	Santa Monica Mountains dudleya
Dudleya verityi	Verity’s dudleya
Eriogonum crocatum	Conejo buckwheat
Holodiscus discolor	Oceanspray
Juncus patens/textilis	(rush)
Lonicera hispidula var. vacillans	Hispid honeysuckle
Monardella lanceolata	Lance-leaf monardella
Monolopia lanceolata	Monolopia
Navarretia "ojaiensis"	Ojai navarretia (and related species)

Species	Common name
Pentachaeta lyonii	Lyon’s pentachaeta
Papaver heterophylla	Wind poppy
Thelypteris puberula var. sonorensis	Sonoran maiden fern
Vicia hassei	Hass’s vicia

Appendix B. Review of vegetation mapping and classification, including high-priority vegetation types.

Review of vegetation mapping and classification
When the National Park Service (NPS) mapped the vegetation of the Santa Monica Mountains, the hierarchy used was three-parted, with "formation" the broadest, then "alliance", then "association". In general, "association" is basically the narrowest grouping of vegetation based on dominant trees and shrubs, such as "black sage with laurel sumac".

Moving up the hierarchy, these associations may be grouped by similar species, such that all associations with black sage are grouped into the "black sage alliance", and so forth.

Alliances were then arranged into 28 "formations" based on vegetation structure and climatic zone:

1. Lowland or submontane winter-rain evergreen sclerophyllous forest
2. Temporarily flooded cold-deciduous forest
3. Sclerophyllous extremely xeromorphic evergreen woodland
4. Cold deciduous woodland
5. Temporarily-flooded cold-deciduous woodland
6. Tropical or subtropical broad-leaved evergreen shrubland
7. Temperate broad-leaved evergreen shrubland
8. Sclerophyllous temperate broad-leaved evergreen shrubland
9. Lowland microphyllous evergreen shrubland
10. Intermittently flooded microphyllous shrubland
11. Facultatively deciduous extremely xeromorphic subdesert shrubland
12. Succulent extremely xeromorphic evergreen shrubland
13. Lowland drought-deciduous shrubland
14. Intermittently flooded cold-deciduous shrubland
15. Mixed evergreen cold-deciduous shrubland
16. Facultatively deciduous subdesert dwarf-shrubland
17. Tall sod temperate grassland
18. Medium-tall bunch temperate or subpolar grassland
19. Intermittently flooded temperate or subpolar grassland
20. Temporarily flooded temperate or subpolar grassland
21. Seasonally flooded temperate or subpolar grassland
22. Semipermanently flooded temperate or subpolar grassland
23. Tall temperate or subpolar perennial forb vegetation
24. Intermittently flooded perennial herbaceous vegetation
25. Creeping or matted cold-deciduous dwarf shrubland
26. Low temperate or subpolar perennial forb vegetation
27. Tidal temperate perennial forb vegetation
28. Medium-tall temperate annual grassland

Several hundred of these individual associations were mapped by NPS in the Santa Monicas, including more than 200 within the SMM Coastal Zone.

<u>Challenges of using formation/alliance/association</u>
Unfortunately, the list of "formations" is not just very long for being a list of the broadest categories; practically all of the categories employ technical floristic terminology, and thus

would be very difficult for planners and the general public to understand as projects come in for review. A few familiar habitat types, such as oak woodland, are relatively easy to find in this classification (it's #3, "sclerophyllous extremely xeromorphic evergreen woodland"); however, some are nearly impossible to find, such as "mixed chaparral", which is split up among several unrelated formations. Unfortunately, habitat types that would be expected to support nearly identical wildlife species, such as scrub dominated by California sagebrush and purple sage, vs. that with California sagebrush, purple sage, and sugarbush, appear in two distinct formations. For another example, bay-sycamore, willow, alder and mulefat "alliances" are readily recognizable as part of a single ecosystem (which we called "riparian") and frequently co-occur in the study area, varying with slight differences in water regime, slope, etc. Yet, each was each placed in one of four different formations (described further below).

Often, the reverse occurs – individual formations listed above often encompass vegetation types that many ecologists would consider separate natural communities. For example, the formation called "lowland or submontane winter-rain evergreen sclerophyllous forest" is comprised of a single native alliance, California bay forest, and mapped as occurring in four distinct associations. However, two of the associations might be considered a riparian community (including bay-sycamore forest), while others might be drier woodland or even a form of chaparral (e.g., California bay/black walnut/greenbark ceanothus), based on the other species occurring there.

Finally, there exist several natural communities in the Coastal Zone that represent a combination of both biotic and abiotic features (such as rock outcrops or seeps), and that do not correspond to any recognized, much less mapped, plant community (but that are nonetheless extremely important, ecologically). These are therefore inadequately portrayed using simply the existing vegetation maps, which treat only the dominant vegetation, and not the "whole ecosystem" involved, as we have tried to accomplish with our ecological divisions.

The ecologists at NPS tried to address these nomenclatural issues by arranging the associations and alliances based on where they co-occur in life, and by employing more familiar terms (called "ecological groupings"), but even these groupings are rather technical and not likely to be understood by planners, applicants, and even ecologists ("Interior Mesic Chaparral", "Dry-Mesic Trees").

Inadequacy of "asterisk approach"

Since at least the 1980s, the California Department of Fish and Wildlife (formerly Fish and Game) has sought to draw attention to plant communities that may be rare at the state level, or that deserve further research to determine their conservation status. These "high-priority vegetation types[39]" are assemblages of plants that are, for various reasons, considered to be of high conservation priority by state agencies such as California Department of Fish and Wildlife, and thus are afforded special status under CEQA. As of 2010, there were more than 1,400 of these high-priority vegetation types statewide. About 300 have been identified

[39] See: http://www.dfg.ca.gov/biogeodata/vegcamp/natural_comm_background.asp

as S1, S2, or S3, or "state-rare" using NatureServe's "Heritage Methodology"; the remainder having been "grandfathered in" because they were included as rare – and marked with an asterisk – in an early list of California natural communities (Holland 1986), which predates the association/alliance scheme; or, they are included as high priority because one or more authorities has considered them to be rare or of potential conservation concern. These vegetation types are now included as "asterisked associations" in the current the standard vegetation classification system for the state (Keeler-Wolf et al. 2008).

In our analysis of Santa Monica Mountains habitats for this project, we elected to not simply consider any of these high-priority vegetation types as "automatically EHSA" (or any other level of protection), based on two factors:

1) A close reading of the way these communities had been originally determined to be of high priority, and
2) Guidelines from most recent authority on California vegetation (MCV2) for recognizing and assessing high-priority vegetation types in the field.

The references provided (by MCV2) for supporting the "high priority" designations are mainly vegetation mapping studies, including that done for the Santa Monica Mountains which was the source for the GIS vegetation layers used here (CDFG 2006), or for other regions of southern California (e.g., Gordon and White 1994 for the national forest areas of the Transverse and Peninsular Ranges). These reports provided little information on rarity, threat, ecological function and importance, or other factors that would normally be used to establish prioritization for ecological communities, and (at least in the case of CDFG 2006) frequently refer back to earlier vegetation mapping efforts, including the original 1986 California natural communities report (Holland 1986), which MCV2 was meant to replace, and which provided almost no specific information on the status of the vegetation types, other than marking them with an asterisk.

Clearly, many of these vegetation associations are truly rare, in that they do not occur widely. But others are objectively not, such as chamise chaparral, and so their asterisk may well have been applied for other reasons, such as the unique plant and animal community they support, or their response to frequent fire. Either way, this illustrates the importance of treating these designations as more of a guide, rather than a true analysis of vegetation rarity and importance.

Indeed, the guidelines provided in MCV2 for analyzing vegetation rarity do not suggest that all "high-priority" vegetation associations should be automatically treated as high conservation concern, and therefore possibly warranting an ESHA designation[40]. Rather, the guidelines recommend that only "high-quality examples" of these vegetation types may qualify for this ranking (see below). Given the scale at which the plant associations were mapped in the Santa Monica Mountains, it was not possible to determine the quality of each stand of vegetation for this report. From the MCV2 background information:

> *"Ascertain if project-affected stands of these vegetation types or natural communities can be considered as high-quality occurrences of the given community. The judgment of whether a*

[40] http://www.dfg.ca.gov/biogeodata/vegcamp/natural_comm_background.asp

*stand is high quality or not involves a flexible set of criteria such as the range of existing sustainable occurrences of this element or vegetation type based on site quality, defensibility, size, and surrounding landscapes. These criteria vary based on the type of vegetation or natural community and the range of existing occurrences known. For example, it is likely that although there are many individual stands (or occurrences) and many thousands of acres of Douglas-fir/Vine maple/Oregon grape association (*82.200.20* Pseudotsuga menziesii / Acer circinatum - Mahonia nervosa*) in northwestern California, there are only a few that reflect the most exemplary qualities of natural vegetation including:*

1. *lack of invasive exotic species,*
2. *no evidence of human-caused disturbance such as roads or excessive livestock grazing, or high-grade logging,*
3. *evidence of reproduction present (sprouts, seedlings, adult individuals of reproductive age), and*
4. *no significant insect or disease damage, etc.*

For this community, these characteristics exemplify high quality, sustainable, old growth characteristics. Thus the ranking of this association is based on the restricted high quality examples. If a project would affect a small acreage of second growth stand of this type, unless there are other plant or animal elements of significance associated with it, it is unlikely that this would constitute a significant impact. Modification of this stand would be considered less likely to be a serious threat to the existence of all high quality stands of this type.*"*

In addition, the determination of quality itself would depend on the vegetation under investigation; a high-quality oak forest would have vastly different physical and biological characteristics than would a high-quality wildflower field, particularly in areas where non-native grasses dominate the latter community. Furthermore, many habitats operate at multiple scales, such as valley oak savannah, where a single large oak may be valuable for some species such as woodpeckers, but other species, such as raptors, may use the grassy openings that are only found in extensive expanses of valley oak savannah across a large landscape.

While we do not agree with the suggestion (by MCV2) that small, isolated occurrences are necessarily of lower quality than large ones, we assert that these determinations need to be made in the field by experts, and reviewed by a competent panel of experts in some cases (e.g., the Environmental Review Board, in the Santa Monica Mountains). Either way, these determinations are beyond the reach of large-scale mapping efforts (particularly mapping based largely on remote-sensing, as was done by NPS).

<u>Our alternative approach</u>

For these reasons, we elected to develop a list of natural communities similar that had been in use since the 1980s (Holland 1986), and to make reference to the newer MCV2 classification upon which the NPS mapping was made (rather than the other way around). Based on our years of conducting biological assessment and wildlife surveys throughout the region, we identified five of the broadest types of "ecological communities" that encompass the diversity of the study area, but also which are widely-understood by ecologists and planners: 1) Riparian (associated with stream courses), 2) Woodland and Savannah (non-riparian), 3) Scrub (including chaparral and coastal sage scrub), 4) Grassland (including areas of native wildflowers) and 5) Rock Outcrop. A sixth community, Seeps and Springs, is

described but is generally too small to be mapped at the scale that NPS used. Our reviewers generally approved of our divisions and agreed with our approach.

We acknowledge that our approach isn't perfect; for example, John Tiszler of NPS commented that we could have separated coastal scrub from chaparral, given how varied these shrublands can be. However, we note that, while differences in the dominant shrub species of coastal scrub and chaparral are indeed maintained in the field (e.g., large areas have either one or the other), the herb layer – and, just as importantly, the wildlife communities found in each – overlap greatly in the Coastal Zone. Again, this is based on our experience in the region; almost nothing quantitative has been published trying to classify the wildlife communities of the Santa Monica Mountains, much less the Coastal Zone specifically.

The Coastal Zone is unlike other parts of the Santa Monicas in lacking a distinct "coastal sage scrub" bird or herptile community (i.e., one that is different from that of low chaparral). In other parts of these mountains, coastal sage scrub supports the California gnatcatcher, cactus wren, and rosy boa, species often absent in areas of chaparral. These species are absent from our study area (they do occur farther west, in Ventura County). In the Coastal Zone, "scrub" species, such as California Thrasher or Striped Racer, occur very widely and in many different scrub types, from buckwheat and sage-dominated scrub on coastal bluffs, up into chamise chaparral high on Castro Crest. Obviously, there are many localized plants, mainly forbs, that are confined to one region or another, but these also occur scattered across multiple plant community types, and appear to be more tied to specific soils or physical features such as rock outcrops and ridges than to particular vegetation types.

For the sake of clarity and to conform with existing schema, the list below shows how our own "ecological communities" align with NPS's ecological communities:

Cooper/Hamilton: Riparian
- *NPS: Riparian Shrubs*
- *NPS: Riparian Trees*

Cooper/Hamilton: Native Woodland and Savannah
- *NPS: Mesic Trees*
- *NPS: Dry-Mesic Trees*
- *NPS: Dry Trees*

Cooper/Hamilton: Coastal Bluff Scrub
- *NPS: Steep Rocky Fog Influenced Coastal Sage Scrub (in part)*

Cooper/Hamilton: (Ashy) Buckwheat Scrub
- *NPS: Steep Rocky Fog Influenced Coastal Sage Scrub (in part)*
- *NPS: Sub-Mesic Coastal Sage Scrub (in part)*
- *NPS: Mesic Coastal Sage Scrub (in part)*

Cooper/Hamilton: (Coast) Buckwheat Scrub
NPS: Steep Rocky Dry Inland Coastal Sage Scrub (in part)
NPS: Sub-Mesic Coastal Sage Scrub (in part)

[Note: our category "Coastal Scrub – Other" includes multiple associations found within each of NPS's coastal sage scrub types]

Cooper/Hamilton: Interior Chaparral
NPS: Interior Mesic Chaparral (in part)
NPS: Interior Xeric Chaparral (in part)
NPS: Interior Xeric Chamise Chaparral
NPS: Coastal Xeric Chaparral (in part)

Cooper/Hamilton: Chaparral – Other
NPS: Coastal Mesic Chaparral (and portions of other NPS communities)

Cooper/Hamilton: Grassland
NPS: Mesic Coastal Sage Scrub (in part)

Cooper/Hamilton: Rock Outcrop
NPS: Sparsely to Non Vegetated (in part)

Note: several NPS categories were found only in urbanized/developed areas, or were too small to be mapped include Dry-Mesic Herbaceous and Interior Wetland Herbaceous. We omit these here.

To more accurately illustrate how our classification interacts with NPS's formation-alliance-association division, a diagram of the relationship between our "broad type" communities and the formation-alliance-association organizational scheme of NPS is provided in the following relationship tables.

Table 1 shows the formations and alliances that make up our "Native Woodland and Savannah" type, and Table 2 shows those that make up our "Riparian" type. The largest of our categories, "Scrub", contains so many alliances within its 10 formations (Table 3) that we split off two of the largest formations (Table 3a, Table 3b), which roughly correspond to chaparral (largely evergreen) and coastal scrub (largely deciduous), in additional to several miscellaneous shrubland communities. Within "Scrub", we identified several chaparral and coastal scrub subtypes, including alluvial scrub, coastal bluff scrub, buckwheat scrub (two kinds), and interior chaparral. These were based on known associated wildlife and forb (i.e., non-shrub) species, which in some cases are largely restricted to them and found nowhere else in the range.

The remaining scrub communities were lumped (for our classification purposes) into either "chaparral-other" and "coastal scrub-other", which represent a somewhat arbitrary grouping of both very widespread communities as well as locally-rare stands of otherwise common shrubs that don't appear to support distinct or unique wildlife or forbs. Several of these were

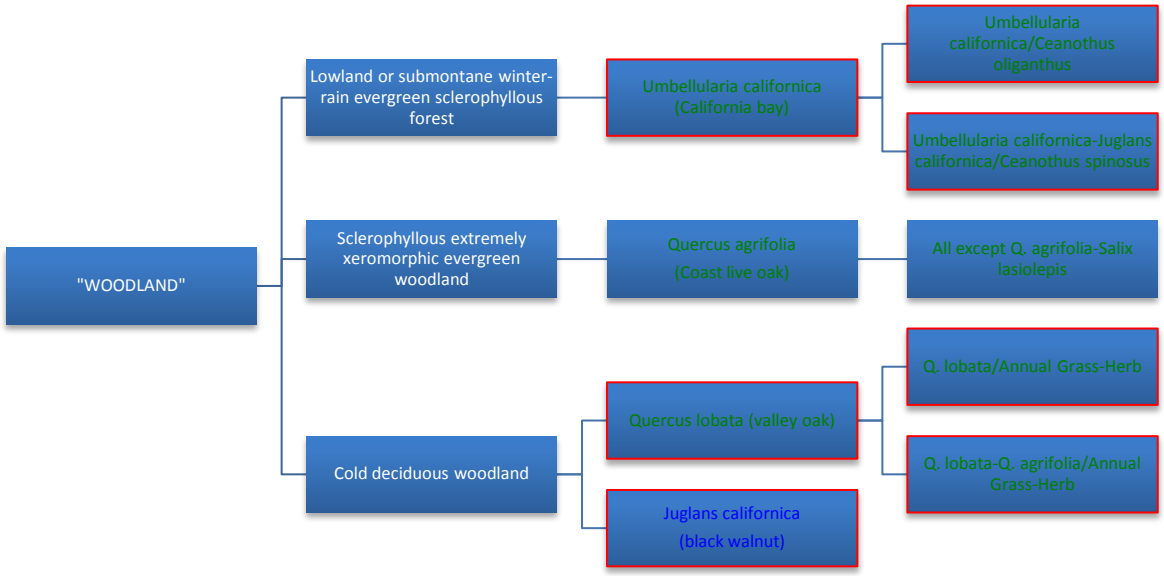
too small to be mapped by NPS, but could be listed for biologists conducting site-specific surveys, who would be asked to map them at the site level. These are discussed further below ("high-priority vegetation types"). Table 4 presents a breakdown of herbaceous communities; again, many of these were too small to have been mapped by NPS and would have to wait for site-specific surveys to be revealed as present in a given area.

Because of the difficulty in "matching up" alliances/associations with more widely-understood ecological communities, we used colored text within the boxes in the tables below to denote which alliances/associations we included in our own habitat divisions (e.g., our "interior chaparral" is *any* chaparral dominated by chamise, manzanita, redshanks, and/or rare *Ceanothus* species).

Note: the red borders around the boxes in the tables below indicate the presence of "asterisked" plant communities within the given alliance or association, as identified by CDFW. These are discussed further below (see "high-priority vegetation types").

Table B1. Native Woodland and Savannah

Main type
(Cooper/Hamilton) Formation (NPS) Alliance (NPS) Association (NPS)

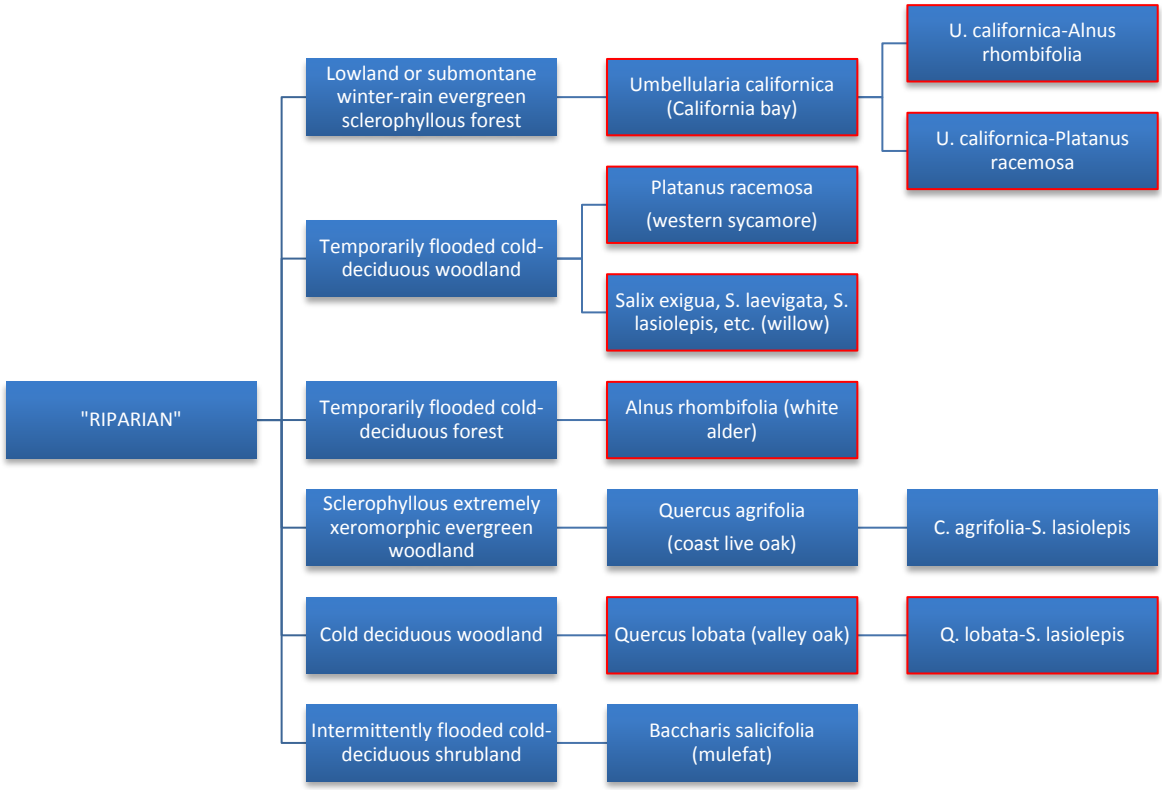


Green: Included in “Oak/bay woodland/savannah” subtype (Cooper/Hamilton).
Blue: Included in “walnut woodland” subtype (Cooper/Hamilton).

Note: Woodlands are divided into two subtypes out of recognition that walnut woodland lacks many species found in oak-bay woodland and savannah.

Table B2. Riparian

Main type (Cooper/Hamilton)	Formation (NPS)	Alliance (NPS)	Association (NPS)

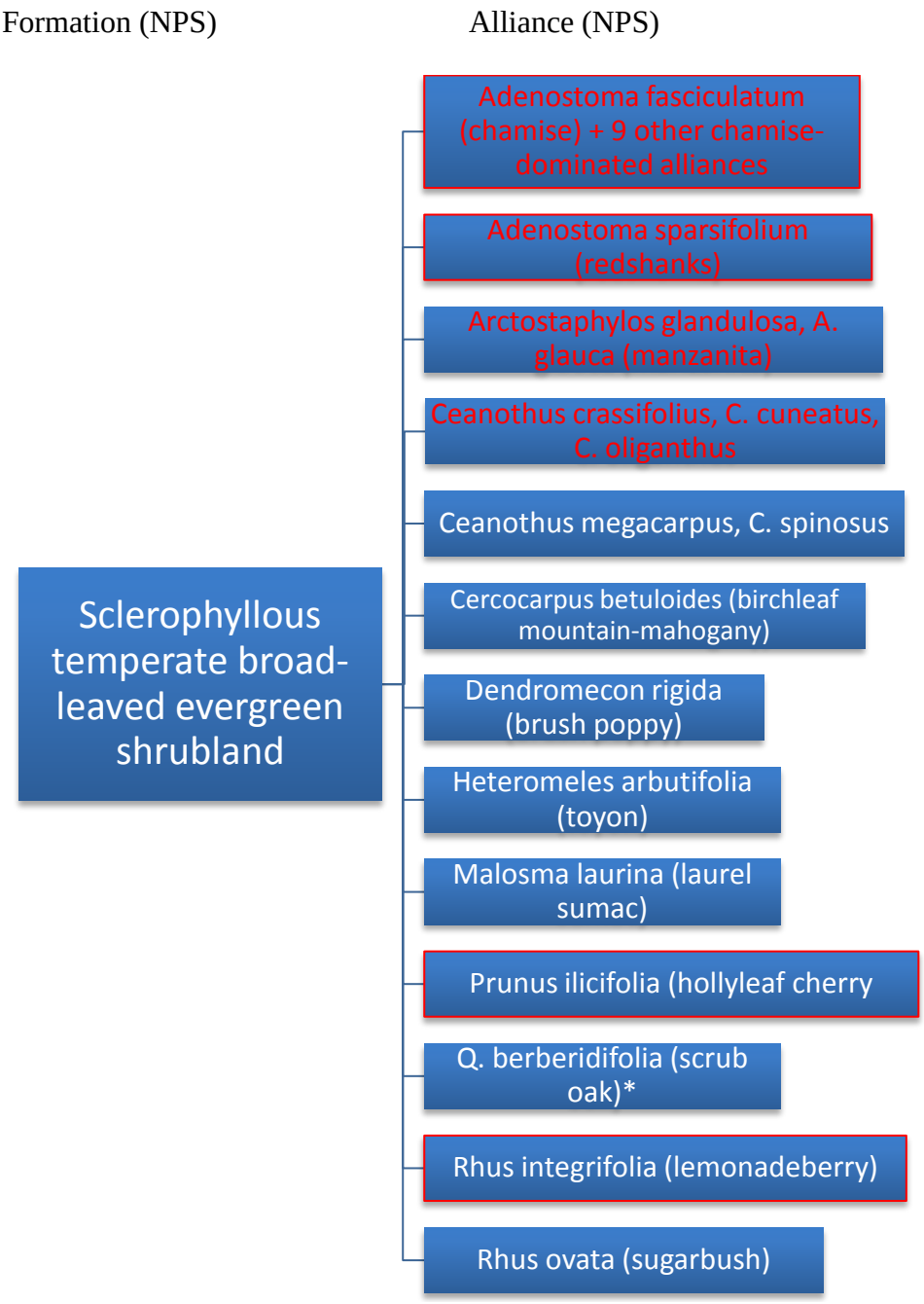


The “Riparian” category of Cooper/Hamilton includes all native associations within all alliances shown above.

Table B3. Scrub

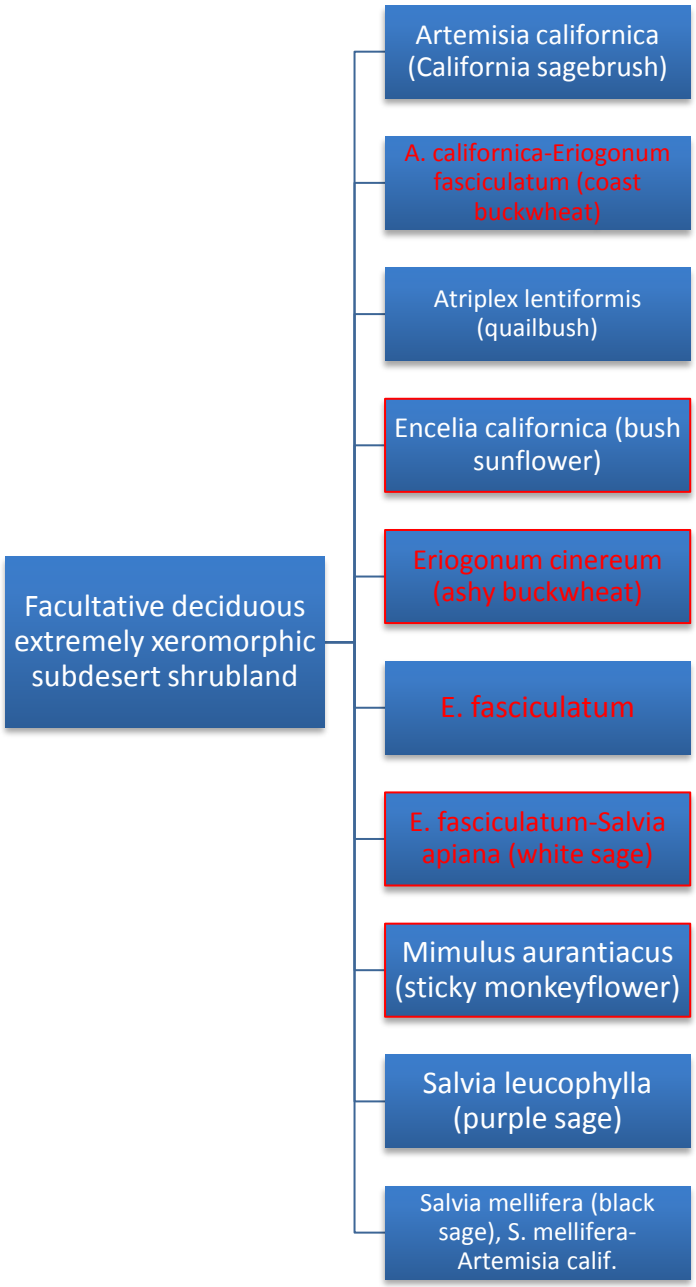
Red: Included in “Alluvial scrub” subtype (Cooper/Hamilton)
Yellow: Included in “Coastal bluff scrub” subtype (Cooper/Hamilton)
Additional alliances and associations shown were treated as either “chaparral-other” or “coastal scrub-other”, depending on whether they were dominated by evergreen (chaparral) or deciduous (coastal scrub) vegetation, or were too small to be mapped (e.g., *Rosa californica*, *Sambucus mexicana*) and thus best left for site-specific surveys to evaluate.

Table B4a. Chaparral “detail”



Red: Included in "Interior chaparral" subtype (Cooper/Hamilton)
Other alliances treated as "chaparral-other" (Cooper/Hamilton).
*Additional related alliances include *Q. berberidifolia-Cercocarpus betuloides*, and *Q. wislizenii* var. *fructescens*, the last of which was not mapped in the study area, but which would be treated as significant/ESHA if found.

Table B4b. Coastal Scrub “detail”



Red: Included in “Buckwheat scrub” subtype (Cooper/Hamilton)
Note: any other alliance or association within any formation found to have a perennial buckwheat as a co-dominant was also treated as buckwheat scrub, to capture this important component). Other alliances above were treated as “coastal scrub-other”, or were too small to map (e.g., *Mimulus aurantiacus*, *Atriplex lentiformis*) and thus best left for site-specific surveys to evaluate.

Table B5. Grassland (including native grassland, non-native grassland, and mixed native/non-native herbaceous-dominated communities)

Main type (Cooper/Hamilton)	Formation (NPS)	Alliance (NPS)
"Grassland"	Medium-tall bunch temperate or subpolar grassland	Nassella spp. (2; Needlegrass)*
		Leymus triticoides (alkali rye)
	Medium-tall temperate annual grassland	California annual grassland/herbaceous
"Rock Outcrop"	Low temperate or subpolar perennial forb vegetation	Selaginella bigelovii (spike-moss)
"Artificial Ponds"	Semipermanently flooded temperate or subpolar grassland	Scirpus californicus (California bullrush)
		Typha spp. (Cattail)
"Seep/Spring"	Tall sod temperate grassland	Leymus condensatus (giant wild-rye)

Most herbaceous communities were too small to be mapped by NPS. Any alliance or association found to have a native grass as a co-dominant was treated as (native) grassland, to capture this important component. Others would be treated under Seeps/springs.

Appendix C. Classification of Habitats.

Table C1a. Classification of Ecological Communities, Part I.

Main Type	Ecological Community	Subtype	Clarifying description
RIPARIAN			Willow/sycamore, often associated with streams, ponds, etc.; includes scrub (e.g., mulefat scrub).
WOODLAND			
	Native woodland		
		Oak/bay woodland/savannah	
		Walnut woodland	
	Non-native woodland		Eucalyptus, etc.
SCRUB			
	Alluvial Scrub		Along active streambeds; dominated by scalebroom (*Lepidospartum squammatum*)
	Coastal Bluff/Beach Scrub		Along immediate coast; typically dominated by California bush-sunflower, giant coreopsis (west of Pt. Dume)
	Buckwheat Scrub		
		Coastal Scrub – buckwheat (ashy buckwheat)	Coastal Scrub with ashy buckwheat (*Eriogonum cinereum*) dominant/co-dominant.
		Coastal Scrub – buckwheat (California buckwheat)	Coastal Scrub with California buckwheat (*E. fasciculatum*) dominant/co-dominant.
	Sage Scrub		Includes California sagebrush, sages, others

Main Type	Ecological Community	Subtype	Clarifying description
	Interior Chaparral		Includes chamise, redshank, rare ceanothus.
	Coastal Chaparral		Includes Ceanothus megacarpus/C. spinosus, scrub oak, sumacs, sages
	Riparian Scrub (see riparian woodland, below)		
GRASSLAND			
	Native Grassland		Includes grassland with a significant component of native grasses or forbs, where "significant" may refer to percent dominance as well as notable native species.
	Ruderal Grassland		Grassland without a "significant" component of native grasses/forbs; typically in highly disturbed areas (doesn't include fuel breaks, roadsides, which are "urban habitats"
ROCK OUTCROPS			May support a variety of vegetation types, typically scrub.
MISC.			
	Seeps/Springs		Small areas of naturally wet soil, with flowing water or not, within a variety of other habitat types.
	Artificial Ponds/Open Water		Restricted to a single property (as known), Malibu Country Club
	Streambeds (see riparian woodland)		N/A

Table C1b. Classification of Ecological Communities, Part II.

Ecological community/ subtype	Represents a distinct natural community (e.g., numerous plant and animal species found only/mainly here, where they occur in CZ)		Rarity of habitat type		Important habitat for special-status species *in CZ*?		If no, otherwise significant? (describe)	"Easily disturbed" *in CZ*?	
	Yes/No	Describe	Global/Regional	Local (SMM)	Yes/No	Describe		Yes/no	Describe
Riparian (all subtypes)	Yes	Many riparian obligate plant/animal species	Found throughout western U.S., but many species restricted to CA	Restricted to narrow canyons	Yes	Two-striped garter-snake, yellow warbler, etc.		Yes	Extremely prone to non-native plant invasion due to water availability year-round; slow to recover post-fire (often becomes weedy/type-converts).
Oak/bay Woodland/savannah	Yes	Many oak-requiring animals (and a few plants); California sister, acorn woodpecker, oak titmouse, etc.	Restricted to CA; widespread in Coast Range, Sierra foothills	Patchy; dominant only vic. Topanga, Cold Creek	No	A few uncommon plants occur, but also occur widely in various habitats.	"Jurisdictional" (trees/groves protected by County ordinance)	Yes	Prone to non-native plant invasion; slow to recover post-fire (oaks frequently killed).
Walnut Woodland	See note	Often co-occurs with oak woodland as oak-walnut woodland or along canyon bottoms; rarely forms pure stands in CZ.	Restricted to SoCal	Patchy, rarely dominant, but widespread.	No	Walnuts occur scattered across many habitats.	"Jurisdictional" (trees/groves protected by County ordinance)	No	Infrequently forms a pure woodland in CZ; when it does, typically with non-native understory and due to prior disturbance (= fire).
Non-native Woodland	No	Several species are stronly associated with non-native woodlands, but these are typically widespread.	N/A	Widespread, but patchy; associated with houses/"ranch ettes"	No	While raptors tend to nest in non-native trees, none of the local species is sensitive.	No	N/A	
Alluvial Scrub	Yes	Very loose soil used by burrowing animals (reptiles, amphibians, small mammals); distinct invertebrate community (fall-blooming scalebroom and other asteraceous shrubs)	Restricted to CA, mainly coastal southern Calif.	Very rare in SMM (<1% of cover)	Unknown			Yes	Trampling by people/pets destroys lichen crust of soil and damages rodent burrows; suceptible to invasive species, esp. grasses.

Coastal Bluff Scrub	Yes	Distinct beach-adapted plants and insects; sand-dwelling reptiles	Restricted to coastal SoCal	Limited to narrow band along immediate coast	Yes	Abronia maritima, Atriplex californica, A. coulteri.		Yes	Trampling by beach-goers, invasion by iceplant, acacia, fountaingrass, etc.
Ecological community/ subtype	**Represents a distinct natural community (e.g., numerous plant and animal species found only/mainly here, where they occur in CZ)**		**Rarity of habitat type**		**Important habitat for special-status species *in CZ*?**		**If no, otherwise significant? (describe)**	**"Easily disturbed" *in CZ*?**	
	Yes/No	**Describe**	**Global/Regional**	**Local (SMM)**	**Yes/No**	**Describe**		**Yes/no**	**Describe**
Buckwheat Scrub (ashy buckwheat)	No	Nearly all species that occur are widespread in other types of coastal scrub.	Restricted to Southern CA	Mainly limited to coastal SMM, PV Peninsula	No		Local form of square-spotted blue (butterfly) appears to be restricted to ashy buckwheat.	No	Resprouts quickly after fuel modification, somewhat resiliant to fire; resistant to invasion of non-natives.
Buckwheat Scrub (California buckwheat)	Yes	Many nectar-feeding butterflies, reptiles (tends to occur on loose/gravelly soil)	Restricted to CA, found widely throughout coastal slope into lower foothills, and locally in desert (e.g., Antelope Valley)	Widespread and abundant	Yes	Important nectar source for several uncommon butterflies, and several special-status animals are often found here (e.g., coast horned lizard), but also occur much more widely.	Associated with several rare plants including Plummer's mariposa lily, but not exclusively so.	No	Resprouts quickly after fuel modification, somewhat resiliant to fire; resistant to invasion of non-natives.
Sage Scrub	No	Supports rare species elsewhere in range (e.g., California gnatcatcher in western SMM)	Restricted to CA; highly variable.	Widespread and abundant, with many subtypes but little difference in animal community	No	Several sensitive species occur in this habitat, but those that do occur very widely, in many other habitats in different parts of the coastal zone.	The species that make up this habitat are globally rare yet locally abundant. ESHA and other habitat rankings may not be appropriate for their continued protection.	See note	Certain sub-types are easily disturbed by invasion by weeds (e.g., California sagebrush scrub) while others are resilient (e.g. Purple sage scrub); probably depends on the substrate in which it grows.
Interior chaparral	No	Only a handful seem restricted to this habitat type.	Restricted to CA; found widely, esp. in Coast Ranges, Sierra Nevada	Limited to higher elevations, but fairly widespread; others less	Yes	Mountain Quail and Bell's Sparrow both appear restricted to this habitat in the	This habitat is a relict of a cooler/wetter period in geological history; may be threatened by	No	Highly resilient to weed-invasion. May be damaged temporarily by fire, but thrives with occassional burning.

				common (e.g., redshank)		CZ	effects of climate change.		
Ecological community/ subtype	**Represents a distinct natural community (e.g., numerous plant and animal species found only/mainly here, where they occur in CZ)**		**Rarity of habitat type**		**Important habitat for special-status species *in CZ*?**		**If no, otherwise significant? (describe)**	**"Easily disturbed" *in CZ*?**	
	Yes/No	**Describe**	**Global/Regional**	**Local (SMM)**	**Yes/No**	**Describe**		**Yes/no**	**Describe**
Coastal Chaparral	No	Nothing seems particularly restricted to this type above other types.	Restricted to CA, mainly southern CA	Widespread and abundant	No		The species that make up this habitat are globally rare yet locally abundant. ESHA and other habitat rankings may not be appropriate for their continued protection.	No	Highly resilient to weed-invasion. May be damaged temporarily by fire, but thrives with occassional burning.
Native Grassland	Yes	Many grassland-dependent species (most the extirpated species in the CZ are grassland spp.)	Restricted to CA	Very rare	Yes	White-tailed kite, loggerhead shrike, rare annuals, etc.		Yes	Susceptible to non-native weed invasion, as well as structural changes from shrub invasion. Habitat examples are extremely fragile where still present.
Ruderal Grassland	No	While this doesn't form a "natural community" per se, the species involved are native and naturally-occurring.	Found throughout western U.S., but many species restricted to CA	Very rare	Yes	White-tailed kite, loggerhead shrike, rare annuals, etc.		Yes	Grassland animal community has been largely lost in CZ, in part due to natural succession of vegetation, but also due to tree-planting/shrub invasion, non-native plant invasion, etc.
Rock Outcrops	Yes	Many rock-dwelling plants, lichens found nowhere else.	Found throughout western U.S., but many species restricted to CA	Rare and patchy, but widespread; two main types (sandtone/ volcanic)	Yes	Santa Susana tarplant, etc.		Yes	Trampling by humans/pets allows for non-native plant invasion, and impacts native mosses/lichens. Human disturbance (e.g. rock-climbing) discourages nesting birds.
Seeps/Springs	Yes	Often combines characteristics of rock outcrops and riparian communities.	Found throughout western U.S., but many species restricted to CA	Rare and very patchy/ isolated	Yes	Amphibians, rare native forbs		Yes	Invasion by non-native plants and animals; desiccation due to a variety of factors.

Artificial Ponds	See note	Not a natural community per se, but many plants/animals found only here	Found throughout western U.S., but many species restricted to CA	Very rare	Unknown		"Jurisdictional"; wetlands, even artificial ponds, may be protected by the Clean Water Act, etc.	N/A	This is a human-created habitat in the CZ.

Table C2. Comparison of Ecological Communities and mapped (NPS) vegetation types.

	ESHA						STEWARDSHIP HABITAT		
	Alluvial Scrub	Coastal Bluff Scrub	Grassland/ Scrub + Native grasses/forbs	Riparian/ Wetland	Rock Outcrops	Oak-Walnut-Bay Woodland	High-elevation chaparral	Coastal scrub + Ashy buckwheat	Coastal scrub + Calif. buckwheat
Arroyo Willow/Laurel Sumac				X					
Arroyo Willow/Mulefat				X					
Ashy Buckwheat								X	
Ashy Buckwheat Alliance								X	
Bigpod Ceanothus-Chamise							X		
Bigpod Ceanothus-Redshank							X		
Birchleaf Mountain Mahogany-Chamise							X		
Black Sage-Ashy Buckwheat								X	
Bushy Spikemoss/California Buckwheat					X				
California Bay						X			
California Bay Alliance						X			
California Bay-California Sycamore				X		X			
California Bay-California Walnut/Greenbark Ceanothus						X			
California Bay/Hairyleaf Ceanothus (provisional)						X			
California Buckwheat									X
California Buckwheat Alliance									X
California Buckwheat-Black Sage-Laurel Sumac									X
California Buckwheat-White Sage Alliance									X
California Bulrush				X					
California Sagebrush-Ashy Buckwheat-Black Sage								X	
California Sagebrush-California Buckwheat Alliance									X
California Sagebrush-California Buckwheat/Annual Grass-Herb			X						X
	ESHA						STEWARDSHIP HABITAT		

	Alluvial Scrub	Coastal Bluff Scrub	Grassland/ Scrub + Native grasses/forbs	Riparian/ Wetland	Rock Outcrops	Oak-Walnut-Bay Woodland	High-elevation chaparral	Coastal scrub + Ashy buckwheat	Coastal scrub + Calif. buckwheat
California Sagebrush-Purple Sage-Ashy Buckwheat/Needlegrass			X					X	
California Sycamore Alliance				X					
California Sycamore South Coast Intermittent Stream				X					
California Sycamore-Coast Live Oak South Coast				X		X			
California Sycamore-Coast Live Oak-Arroyo Willow South Coast				X		X			
California Sycamore-Coast Live Oak/Mulefat South Coast				X		X			
California Sycamore/Annual Grass-Herb				X					
California Walnut Alliance						X			
California Walnut-(Coast Live Oak)/Tall Shrub Superassociation Mapping Unit						X			
California Walnut/California Sagebrush/Giant Wildrye						X			
California Walnut/Greenbark Ceanothus						X			
California Walnut/Laurel Sumac						X			
Ceanothus spp.-Chamise Superalliance Mapping Unit							X		
Chamise									
Chamise-Bigberry Manzanita							X		
Chamise-Bigpod Ceanothus							X		
Chamise-Black Sage							X		
Chamise-Black Sage Alliance							X		
Chamise-Black Sage-Laurel Sumac							X		
Chamise-Black Sage-Sugarbush							X		
Chamise-Bush Monkeyflower							X		
Chamise-California Buckwheat-(Deerweed)							X		
Chamise-Eastwood Manzanita							X		

	ESHA						STEWARDSHIP HABITAT		
	Alluvial Scrub	Coastal Bluff Scrub	Grassland/ Scrub + Native grasses/forbs	Riparian/ Wetland	Rock Outcrops	Oak-Walnut-Bay Woodland	High-elevation chaparral	Coastal scrub + Ashy buckwheat	Coastal scrub + Calif. buckwheat
Chamise-Eastwood Manzanita Alliance							X		
Chamise-Hoaryleaf Ceanothus Alliance							X		
Chamise-Hoaryleaf Ceanothus-Laurel Sumac							X		
Chamise-Laurel Sumac							X		
Chamise-Redshank-Hoaryleaf Ceanothus							X		
Chamise-Scrub Oak							X		
Chamise-Scrub Oak Alliance							X		
Chamise-Wedgeleaf Ceanothus-Black Sage-Laurel Sumac							X		
Coast Live Oak Alliance						X			
Coast Live Oak South Coastal Woodland/Forest Association						X			
Coast Live Oak Superassociation Mapping Unit						X			
Coast Live Oak-Arroyo Willow				X		X			
Coast Live Oak-California Bay						X			
Coast Live Oak-California Bay/Hairyleaf Ceanothus						X			
Coast Live Oak-California Walnut						X			
Coast Live Oak/Annual Grass-Herb						X			
Coast Live Oak/Bush Monkeyflower Phase						X			
Coast Live Oak/Chamise						X	X		
Coast Live Oak/Greenbark Ceanothus						X			
Coast Live Oak/Poison Oak						X			
Coast Live Oak/Purple Sage-California Sagebrush						X			
Coast Live Oak/Scrub Oak						X			
Coast Live Oak/Toyon						X			

	ESHA						STEWARDSHIP HABITAT		
	Alluvial Scrub	Coastal Bluff Scrub	Grassland/ Scrub + Native grasses/forbs	Riparian/ Wetland	Rock Outcrops	Oak-Walnut-Bay Woodland	High-elevation chaparral	Coastal scrub + Ashy buckwheat	Coastal scrub + Calif. buckwheat
Eastwood Manzanita Alliance							X		
Giant Coreopsis-California Sagebrush-Ashy Buckwheat		X					X		
Hairyleaf Ceanothus							X		
Hairyleaf Ceanothus Alliance							X		
Hairyleaf Ceanothus-Redshank							X		
Hairyleaf Ceanothus-Scrub Oak							X		
Hairyleaf Ceanothus-Tall Shrubs Superassociation Mapping Unit							X		
Hoaryleaf Ceanothus							X		
Hoaryleaf Ceanothus Alliance							X		
Hoaryleaf Ceanothus-Laurel Sumac							X		
Laurel Sumac-Ashy Buckwheat								X	
Laurel Sumac-Ashy Buckwheat-Black Sage Phase								X	
Laurel Sumac-Ashy Buckwheat-Deerweed Phase								X	
Laurel Sumac-California Buckwheat									X
Laurel Sumac-Lemonadeberry-Ashy Buckwheat-California Sagebrush Phase								X	
Lemonadeberry-California Sagebrush-Ashy Buckwheat								X	
Mulefat Alliance				X					
Mulefat-Riparian				X					
Native and Non-Native Herbaceous Superallliance Mapping Unit			X						
Purple Sage-Ashy Buckwheat/Annual Grass-Herb			X					X	
Red Willow Alliance				X					
Red Willow and Arroyo Willow Superallliance Mapping Unit				X					
Redshank Alliance							X		

	ESHA						STEWARDSHIP HABITAT		
	Alluvial Scrub	Coastal Bluff Scrub	Grassland/ Scrub + Native grasses/forbs	Riparian/ Wetland	Rock Outcrops	Oak-Walnut-Bay Woodland	High-elevation chaparral	Coastal scrub + Ashy buckwheat	Coastal scrub + Calif. buckwheat
Rock outcrop Mapping Unit					X				
Rock outcrop/Herbaceous Mapping Unit					X				
Rocky Streambed				X					
Sawtooth Goldenbush-California Sagebrush/Grass			X						
Sawtooth Goldenbush/Purple Needlegrass-Clustered Tarplant			X						
Scalebroom Alliance	X								
Urban-California Sycamore				X*					
Urban-California Sycamore-Coast Live Oak				X*					
Urban-Coast Live Oak				X*					
Valley Oak-Arroyo Willow (provisional)				X		X			
Valley Oak-Coast Live Oak/Annual Grass Herb				X		X			
White Alder-California Sycamore				X					
Willow spp. scrubby-California Sycamore scrubby/Mulefat Superalliance Mapping Unit				X					
Willow spp./Giant Reedgrass Suballiance Mapping Unit (AruDon in: 1420/1430/1432 dense)				X					
Willow spp./Giant Reedgrass Superalliance Mapping Unit				X					
Willow spp./Mulefat Superalliance Mapping Unit				X					
* "Disturbed ESHA"									

Appendix D. Suggested template for biological assessments in the Coastal Zone of unincorporated Los Angeles County.

This template is adapted from the one used by Los Angeles County Department of Regional Planning in evaluating SEAs (Sensitive Environmental Areas) and preparing Biological Assessments. It is designed to be implemented by a qualified biologist with at least five years of professional experience in environmental regulation and field-based resource assessment in the Los Angeles area.

The County Biologist shall determine the scope of items to be addressed and may eliminate or add items based on site conditions and after a field visit. On request, the County Biologist will discuss aspects of the scope of work with the applicant or the consultant to the applicant, such that all parties have a working understanding of the requirements at the earliest possible time.

Santa Monica Mountains Biological Assessment Guidelines	**Page**	**Initials**
Title Page		
A. Project name		
B. County identification numbers (Project number, CUP number, APNs).		
C. Applicant name and contact information		
E. Name and affiliation of preparer		
F. Date		
I. Project and survey description		
A. Project description		
1. Project name, type of report, address of project		
2. County application identification numbers including APNs		
3. Applicant name and contact information		
4. Name and affiliation of preparer		
5. Parcel and acreage information (for more than one parcel)		
6. Location		
a. Map of regional features showing project location, including drainages and roads in region		
b. Color aerial photograph showing project parcels, existing development, open space, etc.		
7. Descriptive outline of proposed project		
B. Description of major natural features 1. Landforms and geomorphology 2. Drainage and wetland features 3. Soils (soil/geological map optional)		
C. Methodology of biological survey		
1. Date(s) of survey(s)		
2. Text description of survey methods		
II. Biological Characteristics of the site		
A. Flora		

1. Map of vegetation communities, specifying system used (preferably Sawyer et al. 2008)		
2. Vegetation cover table, with acreages of each vegetation type (can be a legend in map)		
Note: For jurisdictional oaks (>3" DBH) on or within 200' of property, an oak tree report is required. Include oak tree reports in an appendix		
B. Fauna		
1. Discussion of species observed; description of wildlife community		
C. Sensitive species		
1. Table of possible sensitive species and possible sensitive vegetation, including brief discussion of potential impacts to any sensitive species		
2. Maps of occurrence for sensitive species observed		
D. List of flora and fauna observed or known from site		
E. Survey Checklist (see Part B, above)		
V. Bibliography		
A. Bibliography of references cited in text		
VI. Appendices		
A. Site photographs (color)		
B. Qualifications of biologists and other contributors		
C. Oak Tree report for sites with jurisdictional native oak trees (if applicable)		
Digital Copies of biological assessment must be provided to DRP as .pdf for final version, including georeferenced files of vegetative data and sensitive species occurrences.		

APPENDIX B
SIGNIFICANT WATERSHEDS

Significant Watersheds

Significant Watersheds are drainage basins that have been identified by the Santa Monica Mountains Local Coastal Program as containing exceptional undisturbed habitats and/or which are important in contributing to the integrity of the regional ecological system. Significant Wtaersheds contribute to the overall water quality in Santa Monica Bay and the Pacific Ocean, and to the ongoing health of ecosystems in the Coastal Zone.

General Description of Biological Resources

Undeveloped lands in the Santa Monica Mountains are a mosaic of predominately native environments variously disrupted by weedy non-native species, mostly in areas of past and continuing disturbance. Disturbances are of many types and include burned areas, abandoned road networks dating to the early 1900s, pads graded more recently, and fuel modification zones surrounding buildings and along roads. In general, very old disturbances have recovered to native vegetation though the landforms may remain altered. More recent disturbances tend to be more weedy. This is probably as a result of a complex combination of chronic early succession brought about by recent changes in disturbance frequency (especially brush clearance, fire, and off-road vehicle use) and the historical artifact of a greater abundance and diversity of invasive species in recent decades. The oldest additions to the Santa Monica Mountains non-native flora include mostly Mediterranean and African taxa associated with ranching and the Spanish Colonial period. These are generally annual species such as wild oats (*Avena barbata*, *A. fatua*), black and common mustards (*Brassica nigra*, *B. rapa*), and ripgut and red bromes (*Bromus diandrus, B. rubens*). Giant reed (*Arundo donax*) was added to the flora probably at around the same time; it is known to have been cultivated in the Los Angeles River in the mid-1800's, where it was used as a soil stabilizer and a source for light-construction and roofing material. The first houses in the mountains were accompanied by species such as English ivy (*Hedera helix*), slender mustard (*Hirschfeldia incana*), castor bean (*Ricinus communis*), and periwinkle (*Vinca major*). In the mid-1900s Spanish broom (*Spartium junceum*) was widely planted by road crews. Other relatively recent additions to the local flora include ornamental and nuisance species such as golden wattle (*Acacia pycnantha*), false olive (*Buddleja saligna*), yellow star-thistle (*Centaurea melitensis*), Cape ivy (*Delairea odorata*), terrate spurge (*Euphorbia terracina*), gazania (*Gazania linearis*, *G. pectinifera*), and rat-tail fescue (*Vulpia myuros*).

Topographic and geologic diversity are the primary drivers of biological diversity in the Santa Monica Mountains. Topographic variation exposes landscapes to a variety of intensities in sunlight, wind, fog and rain. Geologic diversity further complicates these correlations by providing selective pressure for plant species with varying chemical tolerances and requirements. In addition to these fundamental factors is uplifting of the mountain range

within a matrix of species originating in the deserts, plains, mountain ranges, and seashores of Mexico, the Great Basin, and Coastal California.

In general, south-facing slopes are dominated by the most drought-tolerant vegetation types, collectively grouped under the name of 'coastal sage-scrub.' These formations have an upper canopy of semi-woody shrubs and sub-shrubs, mostly derived from the small-seeded and easily-dispersed sunflower, mint, and buckwheat families. Chaparral formations dominate on north-facing slopes receiving less intense sunlight. Chaparrals have an upper canopy of woody shrubs and small trees, generally derived from species in the rose, buckthorn, oak, and sumac families. Coastal sage-scrub species are usually a sub-dominant or successional component of chaparral communities.

The majority of habitats dominated by trees are confined to riparian areas, but many oak and walnut woodlands occur outside of the direct influence of surface water. In these instances, the woodlands are confined, like the chaparrals, to north-facing slopes. Often, oak woodlands and forests may be found growing on landslides, where soils are deep and well-aerated. Walnut woodlands are another prevalent upland woodland type and occur in areas of higher drought stress than those which would support oak habitats.

Habitats along canyon bottoms and in swales receive greater water inputs than the surrounding uplands. These habitats support riparian and wetland communities mostly dominated by deciduous trees of the willow and sycamore families and shrubs of the sunflower, currant, and honeysuckle families. In areas of permanent flow and exceptionally high water availability, maple, alder, and bay trees are found. Wetlands and areas of low flow velocity support clonal perennial species such as bulrush and cattail.

Watershed function as a biological resource and how it relates to the Local Coastal Program

One of the primary functions of the Local Coastal Program (LCP) is to maintain and improve water quality in the Coastal Zone. To that end, watersheds play an essential role and are afforded heightened protection within the LCP. It is therefore essential to appreciate the dynamic nature of water as a component of the landscape. It may seem obvious, but it is important to understand that *water moves through the landscape*, not simply over it. As it does so, it records the landscape's condition. This record is commonly referred to as "water quality." Watersheds that are impaired, that export water of poor quality, do not convey water at rates that allow for the chemical breakdown and elimination of pollutants. These chemical processes are in large measure, biological processes. The biological processes involved in the removal of pollutants from water require time and a high degree of physical contact between the water and the organisms acting on it. In natural systems these processes occur predominately in upland environments and shallow wetlands of low-velocity flow. Dissolved and suspended constituents of water moving slowly through soil and shallow wetlands have a very high probability of contacting living surfaces, be they microorganisms, fungi, or plant roots. It is at this contact space between the bulk water and living surfaces where water quality is modulated.

It is necessary to highlight the role of upland areas in the modulation of water quality, since a common conception is that water quality is principally regulated by riparian systems (streams

and creeks). However, this is not the case. Riparian systems are the recipients of materials produced and transformed in the uplands. In that regard, they are indicative of the eco-system health of the uplands.

A healthy ecosystem is an efficient consumer of nutrients and energy, and allows very little to escape; in a healthy ecosystem, water and other exported materials are "clean." Ecosystems that are denuded of vegetation or overwhelmed by invasive species lack the diversity which fosters a nearly complete use of energy coming into the ecosystem. Hence, they export excessive amounts of sediment and nutrients. The best way to foster the export of clean water from the Santa Monica Mountains is to ensure that development minimizes disturbances to vegetation and maximizes retention of water and pollutants. Key to this is the use of native plants in landscaping. Native plants do not require irrigation, pesticides, or frequent maintenance, and when these extraneous "energy inputs" are eliminated from an ecosystem, export of pollution is minimized.

For these reasons, development in upland habitats must allow for the slow-rate processes that depend on infiltration and retention of water in soils, and development along streams and creeks must be configured to eliminate the possibility of pollutants entering the water late in its course towards the ocean.

Watersheds, as a fundamental component of ecosystem health, are used in the Land Use Plan to facilitate organization and designation of the land use categories within the Santa Monica Mountains Coastal Zone. The Santa Monica Mountains are incised by a number of drainage systems that have been organized into nineteen named watersheds. In reality the number of watersheds is larger than nineteen and would be defined by the number of drainages leading to the ocean. This is a potentially incalculable number, and for the sake of manageability the Los Angeles County Department of Regional Planning has opted to follow the organizational system developed by the Los Angeles County Department of Public Works. This system groups some of the smaller watersheds and sub-watersheds previously identified as specific resource areas in the 1986 Malibu Land Use Plan. These smaller watersheds and sub-watersheds include Lachusa Canyon, now discussed as a part of Los Alisos Canyon; Newton Canyon, now discussed as a part of Zuma Canyon; Dry Canyon, now discussed as a part of Solstice Canyon; Puerco Canyon, now discussed as a part of Corral Canyon; Cold Creek Canyon, now discussed as a part of Malibu Creek Canyon; and Hepatic Gulch, discussed as a part of Las Flores Canyon. In addition, the Ballona Creek watershed is not discussed here as it occupies a very small portion of the Coastal Zone and drains primarily outside of the immediate vicinity of the Coastal Zone.

Specific Descriptions of Biological Resources by Watershed

The following sections describe the biological attributes of watersheds within the Santa Monica Mountains in order of outflow to the Santa Monica Bay, from west to east.

1. **Arroyo Sequit** supports one of the most extensive and well-developed riparian and oak woodlands and associated stream habitats in the Santa Monica Mountains Coastal Zone. Natural pools, waterfalls, and a variety of riparian trees are present. Arroyo Sequit is one of the few streams in southern California, and one of three watersheds in the Santa

Monica Mountains within Los Angeles County, that still sustains a population of native southern steelhead trout (*Oncorhynchus mykiss irideus*, Federal Endangered, California Species of Concern). The watershed is largely undisturbed, but scattered development is present in the upper watershed along Mulholland Highway west of Little Sycamore Canyon Road, and homes and a campground fragment a stretch of the Canyon bottom north of Leo Carrillo State Park. The creek has been channelized with grouted rip-rap through the campground, and the associated woodland in that area is degraded as a result of building construction, irrigation and soil compaction. Dense thickets of California bay (*Umbellularia californica*) grow extensively along the East Fork. The lower third of the Canyon is within Leo Carrillo State Park and is mostly undisturbed with the exception of campground facilities located on the Canyon floor. The mouth of the Canyon contains significant marine resources. Plummer's mariposa lily (*Calochortus plummerae*, CNPS List 1B) grows within the Canyon and may be impacted by collection by hikers.

2. Most of **San Nicholas Canyon** is within the City of Malibu. Portions within the unincorporated area support a well-developed coast live oak (*Quercus agrifolia*) woodland in association with the creek and native perennial grassland in upland areas.

3. Much of the **Los Alisos (Decker) and Lachusa Canyon** uplands have been developed at a low density and large areas have been converted to non-native grasslands. The entire area burned in 1985. Lowlands support diverse riparian woodlands dominated by western sycamore (*Platanus racemosa*) and coast live oak (*Quercus agrifolia*). Plummer's mariposa (*Calochortus plummerae*, CNPS List 1B) is recorded in Alisos Canyon. The woodland in the vicinity of Decker School Road has been substantially altered or removed as a result of residential development. Sonoran maiden fern (*Thelypteris puberula* var. *sonorensis*, CNPS List 2) and the endemic Santa Monica grasshopper (*Trimerotropis occidentalis*) have been reported from Lachusa Canyon.

4. The floor of **Encinal Canyon** is narrow and supports a dense oak- and sycamore-dominated woodland. A ridge east of Encinal Canyon Road has been severely altered by grading, and scattered residences occur along Encinal Canyon Road near Potrero Road. The Encinal Canyon population of Santa Susana tarplant (*Deinandra minthornii*, State Rare, CNPS List 1B) is likely to be the southernmost occurrence of that species in the world and has been severely impacted by fire suppression activities. The riparian habitat within the Canyon supports a population of Sonoran maiden fern (*Thelypteris puberula* var. *sonorensis*, CNPS List 2).

5. **Trancas Canyon** is one of the larger canyons in the Santa Monica Mountains Coastal Zone. The watershed is relatively undisturbed south of Encinal Canyon Road. Homes, ranches, and recreational facilities, including a golf course, fragment the watershed north of Encinal Canyon Road and along Mulholland Highway. Coast live oak (*Quercus agrifolia*) and western sycamore (*Platanus racemosa*) dominate the riparian woodland. Isolated oak woodlands occur west of Decker Road. Red shanks (*Adenostoma sparsifolium*) is relatively common in the northern Canyon. Santa Monica populations of this species are disjunct from the core range of the species, mostly within San Diego County and Baja California. A population of southwestern pond turtle is known in Trancas Canyon. Santa Monica Mountains grasshopper (*Trimerotropis occidentaloides*) has been collected here

and is known only from the Santa Monica Mountains. Lyon's pentachaeta (*Pentachaeta lyonii*, Federal and State Endangered) is also recorded from this watershed.

6. **Zuma Canyon** is one of the least disturbed and most remote canyons in the Santa Monica Mountains. The slopes are vegetated with coastal sage scrub and chaparral, and the Canyon bottom supports freshwater pools and diverse riparian woodlands. The westernmost-recorded occurrence of Braunton's milkvetch (*Astragalus brauntonii*, Federal Endangered) is in fire breaks in the upper watershed. Distinctive freshwater fauna, including Southwestern pond turtle (*Emys marmorata pallida*, California Species of Concern) and native fish, are associated with the pools scattered throughout the narrow reaches of the Canyon. Golden eagles (*Aquila chrysaetos*, California Species of Concern), bobcats (*Lynx rufus*), mountain lions (*Puma concolor*), and many other secretive species continue to be reported in Zuma Canyon. Zuma Canyon supported nesting habitat for the formerly endangered peregrine falcon (*Falco peregrinus anatum*, California Species of Concern). The Zuma Canyon watershed is largely undeveloped, disturbed mostly by firebreaks and dirt roads. Development is generally confined to the area near the intersections of Kanan Dume Road with Mulholland Highway and Latigo Canyon Road. Infestations of golden wattle (*Acacia pycnantha*) are becoming entrenched near residential developments on Latigo Canyon Road. A vineyard has been established in Newton Canyon, a tributary to Zuma Creek. Newton Canyon also supports riparian woodlands and dense oak woodlands.

7. The upper and middle reaches of **Ramirez Canyon** are densely wooded, primarily with native coast live oak (*Quercus agrifolia*) and isolated western sycamore (*Platanus racemosa*). Grading for Kanan-Dume Road on the west side of the Canyon has disturbed the watershed but the woodland is sufficiently distant from the road to support diverse wildlife, including gray foxes (*Urocyon cinareoargentus*). The lower one-third of the watershed is developed with residences, but the natural stream and many native trees are intact throughout the Canyon bottom, downstream nearly to Pacific Coast Highway. Dense infestations of Spanish broom (*Spartina junceum*) occur along Kanan-Dume Road and Ramirez Motorway; otherwise the vegetation is in excellent condition.

8. The **Escondido Canyon** watershed includes numerous homes and associated roads, particularly on the ridge west of the Canyon bottom. A major route, Latigo Canyon Road, traverses portions of the east side of the watershed. The streambed supports a riparian woodland dominated by western sycamore (*Platanus racemosa*) and coast live oak (*Quercus agrifolia*), similar to that of Ramirez Canyon. Oak woodlands with scattered southern California black walnut (*Juglans californica* var. *californica*, CNPS List 4) occur on the cooler, north-facing slopes west of the stream bottom. An isolated alder (*Alnus rhombifolia*) woodland occurs about mid-canyon. Both the middle and lower reaches of Escondido Canyon have been developed with single-family residences, many of them situated in the riparian woodland habitat. The streambed and many native trees are intact throughout much of the developed lower watershed. The natural stream habitat is substantially more disturbed in the middle reaches where grading and development are more extensive.

9. The **Latigo Canyon** watershed encompasses scattered homes, small roads, and major parts of Latigo Canyon Road on the west side of the Canyon. The watershed is small

relative to many other watersheds in the area; correspondingly, the riparian woodland corridor is short (one-half to two-thirds the length of many others). The least disturbed and most heavily wooded portions of the Canyon are located below and upstream from the Malibu Vista rural village.

10. Most of the **Solstice Canyon** watershed is relatively undisturbed and encompasses highly varied, well-developed riparian woodlands dominated by white alder (*Alnus rhombifolia*), coast live oak (*Quercus agrifolia*), western sycamore (*Platanus racemosa*), and California bay (*Umbellularia californica*). An infestation of terrate spurge (*Euphorbia terracina*) has become established and is expanding at the lower end of the Canyon. There are a few scattered homes and a narrow road in the Canyon bottom, but the woodland is intact throughout the Canyon. Lyon's pentachaeta (*Pentachaeta lyonii*, Federal and State Endangered) is known from this canyon. Due both to the lack of disturbance and the well-developed vegetation, large native wildlife populations are present. Unlike many coastal canyons in the Malibu area, white alder (*Alnus rhombifolia*) occurs even in the lowermost reaches of Solstice Canyon, attesting to the perennial nature of the water supply. Like Zuma Canyon, Solstice Canyon historically provided nesting habitat for the formerly endangered peregrine falcon (*Falco peregrinus anatum*, California Species of Concern). The riparian woodland extends downstream to Pacific Coast Highway.

11. A dense cluster of residences has been developed in **Dry Canyon**, a tributary of Solstice Canyon in the eastern part of the watershed. This is adjacent to the extensively developed El Nido rural village and is traversed by Corral Canyon Road on the east. Dry Canyon supports well-developed riparian woodland habitat, but is not particularly diverse relative to less-disturbed canyons. Wildlife populations are not expected to be large, and sensitive animal species requiring remote, undisturbed habitats are not expected to frequent this watershed. Nevertheless, a large population of Catalina mariposa lily (*Calochortus catalinae*, CNPS List 4) is known from this area, and shrubland understory vegetation is intact, relatively free of invasive species, and supports a high diversity of native grasses.

12. **Corral Canyon** supports dense, diverse, well-developed riparian woodlands similar to those of Solstice Canyon to the west. The upper stretches of the watershed are heavily wooded with mixed riparian and pure oak woodlands. The watershed is relatively undisturbed compared to many other coastal canyons, with the exception of the existing Malibu Bowl rural village, a few structures in the lower Canyon, and scattered dirt roads. Brush clearing activities along Corral Canyon road have encouraged a severe infestation of terrate spurge (*Euphorbia terracina*) and castor bean (*Ricinus communis*). A population of Santa Susana tarplant (*Deinandra minthornii*, State Rare, CNPS List 1B) occurs in marine sandstone outcrops at the top of the watershed, and ocellated Humboldt lily (*Lilium humboldtii* ssp. *ocellata*) is known from Corral Creek.

13. **Puerco Canyon** is a small watershed adjacent to Corral Canyon, the floor of which is densely lined by willows and associated riparian shrubs. The Canyon floor is disturbed by a road and abandoned residences that were burned in wildfires. A large area of fill was developed at the head of the Canyon prior to the 1950s, possibly in relation to the construction of Pacific Coast Highway or Malibu Canyon Road. These disturbed sites and areas south of the intersection of Puerco Motorway and De Bell Ranch Road are the

principle areas in which non-native vegetation is most prevalent. Adjacent slopes are largely undisturbed and support diverse coastal sage scrub and chaparral. Braunton's milkvetch (*Astragalus brauntonii*, Federal Endangered) is known north of the Malibu city boundary. Though relatively small, this canyon is expected to support large wildlife populations due to its relatively undeveloped condition.

14. The **Malibu Creek Watershed** is by far the largest of the watersheds in the Santa Monica Mountains. Indeed, the creek is older than the mountains, as evidenced by the fact that the creek begins north of the range. The watershed supports outstanding oak and riparian woodlands with an unusually large variety of riparian plant species. Black cottonwood (*Populus nigra*), California bay (*Umbellularia californica*), leather-leaf ash (*Fraxinus velutina*), white alder (*Alnus rhombifolia*), arroyo willow (*Salix lasiolepis*), western sycamore (*Platanus racemosa*), coast live oak (*Quercus agrifolia*), California wild grape (*Vitus californica*), and giant chain fern (*Woodwardia fimbriata*) are all present. Portions of the watershed are remote and undisturbed, particularly the central northern portions. Malibu baccharis (*Baccharis malibuensis*, CNPS List 1B) was discovered here in the late 1980s and officially described in 1996. Its range was originally thought to be limited to the Malibu Creek Watershed from the areas near SOKA University westward to Malibu Lake. However, in 2002 a highly noteworthy occurrence was recorded in Orange County. Additional rare plant occurrences within Malibu Canyon include a large population of Plummer's mariposa lily (*Calochortus plummerae*, CNPS List 1B) near Red Rock Canyon, marcescent dudleya (*Dudleya cymosa* ssp. *marcescens*, Federal Threatened, State Rare, CNPS List 1B) in Udell Gorge, Santa Monica Mountains dudleya (*D. cymosa* ssp. *ovatifolia*, Federal Threatened, CNPS List 1B), a disjunct population of round-leaved filaree (*Erodium macrophyllum*, CNPS List 2), Lyon's pentachaeta (*Pentachaeta lyonii*, Federal and State Endangered), and broadleaf stonecrop (*Sedum spathulifolium*). Malibu Creek continues to sustain native steelhead trout (*Onchorhynchus mykiss irideus*, Federal Endangered, California Species of Concern) populations below Rindge Dam, as well as many wildlife species declining in numbers, such as Southwestern pond turtles (*Emys marmorata pallida*, California Species of Concern), mountain lions (*Puma concolor*), and golden eagles (*Aquila chrysaetos*, California Species of Concern). Furthermore, the mouth of Malibu Creek supports the only remaining functional lagoon in Los Angeles County. This area provides a critical refuge for migratory shorebirds and waterfowl, and supports populations of at least 18 native fishes. The lagoon and lower portions of the creek support populations of tidewater goby (*Eucyclogobius newberryi*, Federal Endangered, California Species of Concern) and arroyo chub (*Gila orcutti*, California Species of Concern). Malibu Canyon and the lagoon have been subjected to various human impacts including habitat removal, increased siltation, sewage effluent discharge, harassment of wildlife by domestic animals and people, and fragmentation by roads and residences. North of Pepperdine University, a small-scale grazing and agricultural operation has contributed to the local increase of invasive species, including terrate spurge (*Euphorbia terracina*) and pigweed amaranth (*Amaranthus retroflexus*). Much of the remaining watershed within the Coastal Zone is undisturbed. Development is concentrated in the middle watershed (Monte Nido area) and the lower watershed (vicinity of the Malibu Civic Center). The watershed is dominated by a diverse mosaic of chaparral, coastal sage scrub, grassland, and native woodlands.

15. **Cold Creek Canyon** is an eastern tributary of Malibu Creek. It contains year-round water and supports well-developed native vegetation and wildlife. Undisturbed stands of chaparral, oak woodland, coastal sage scrub, riparian woodland, and associated wildlife inhabit Cold Creek Canyon and Dark Canyon. The Cold Creek watershed, which Dark Canyon drains into, is one of two remaining watersheds in the Santa Monica Mountains to contain stoneflies (Order Plecoptera), a group of aquatic insects very sensitive to impacts from siltation and urban runoff. Many other uncommon plant and animal species occur in this area including big-leaf maple (*Acer macrophyllum*), red shanks (*Adenostoma parvifolia*), Malibu baccharis (*Baccharis malibuensis*, CNPS List 1B), island mountain mahogany (*Cercocarpus betuloides* var. *blancheae*, CNPS List 4), Santa Susana tarplant (*Deinandra minthornii*, State Rare, CNPS List 1B), stream orchid (*Epipactis gigantea*), flowering ash (*Fraxinus dipetala*), ocellated Humboldt lily (*Lilium humboldtii* ssp. *ocellatum*, CNPS List 4), and interior live oak (*Quercus wislizenii*). In addition, several pockets of native grassland supporting Federally-endangered Lyon's pentachaeta (*Pentachaeta lyonii*, Federal and State Endangered) occur here. The central core of the Cold Creek watershed, much of it in public ownership, is generally undisturbed and utilized for natural resource-oriented activities. Residential development is heaviest along Stunt Ranch Road within a mile of Mulholland Highway and lower in the drainage basin within the community of Monte Nido, and the lower parts of Piuma Road in Dark Canyon, before the watershed joins the Malibu Creek drainage.

16. The floor of **Carbon Canyon** is lined with well-developed riparian woodland, particularly in the upper reaches. The lowermost portion of the Carbon Canyon riparian corridor is more disturbed, sparsely developed, and located immediately adjacent to Carbon Canyon Road. The west side of the watershed is relatively undeveloped, and the east side contains numerous residences and is traversed by Rambla Pacifico, a major road. Extensive rock formations in the head of Carbon Canyon provide perching and nesting habitat for sensitive birds of prey.

17. The middle and upper reaches of **Las Flores Canyon** are remote and undisturbed, whereas the lower reaches contain substantial development concentrated along Las Flores Canyon Road. A critical portion of the Las Flores watershed is the dense riparian woodland and associated stream habitat that extends upstream from the intersection of Gorge Road and Las Flores Canyon Road. This area supports western sycamore (*Platanus racemosa*), white alder (*Alnus rhombifolia*), California bay (*Umbellularia californica*), coast live oak (*Quercus agrifolia*), and associated sensitive understory species. Wildlife requiring undisturbed remote brush areas frequent this canyon as do sensitive riparian wildlife such as red-shouldered hawk (*Buteo lineatus*). The Canyon and associated upland vegetation have been severely damaged by frequent brush fires.

18. Another highly significant feature of Las Flores Canyon is **Hepatic Gulch**, a small, rocky area supporting an unusual blend of primitive, moisture-requiring plant species known collectively as cryptogams. These include mosses, liverworts, hornworts, and ferns. These plants form an unusual association with drought-adapted plant species such as yucca and other chaparral species. This unique habitat has developed as a result of the concentration of runoff along the sandstone rock formation. The area also supports numerous uncommon taxa of vascular plants, including wooly Indian paintbrush (*Castilleja foliolosa*), Wright's buckwheat (*Eriogonum wrightii* var. *membranaceum*), and an

unusually dense population of red-skinned onion (*Allium haematochiton*). The area is affected by surrounding residential development, and has been moderately invaded by non-native grasses. A population of false olive (*Buddleja saligna*) is becoming established, probably originating from ornamental plantings in a residential development on higher slopes.

19. **Piedra Gorda Canyon** is a small, undeveloped watershed. It is not heavily wooded like nearby Las Flores or Tuna Canyons; rather, it supports scattered riparian trees and dense riparian thickets. Wildlife populations are expected to be fairly large despite the small size of this watershed due to its degree of isolation.

20. **Tuna and Peña Canyons** are nearly undisturbed with the exception of several concentrated ranch and residential areas at the top of Tuna Canyon. A winding narrow one-way road (Tuna Canyon Road) runs the length of Tuna Canyon. Several single-family residences have been constructed in the upper reaches of the Tuna Canyon watershed within recent years, and a reservoir was built here in the latter half of the 1900s that now serves as a stopover point for waterfowl. Tuna and Peña Canyons are considered sensitive because of a combination of factors including the presence of healthy vegetation, well-developed riparian woodlands, year-round water, and the near lack of significant development with the exception of upper Tuna Canyon. In addition to dense stands of western sycamore (*Platanus racemosa*), coast live oak (*Quercus agrifolia*), and California bay (*Umbellularia californica*), these canyons also support white alder (*Alnus rhombifolia*), black cottonwood (*Populus nigra*), and giant chain fern (*Woodwardia fimbriata*). Peña Canyon is nearly undisturbed with the exception of off-road vehicle tracks in its uppermost reaches. Tuna Canyon has undergone considerably more human impact, particularly in the northwest portion where grading and grazing have been relatively heavy.

21. **Topanga Canyon** is a large coastal canyon that supports varied native riparian vegetation and wildlife. It also contains extensive residential and commercial development in the northern two thirds of its length. The southern portion has remained undisturbed between the communities of Fernwood and Sunset Point and is under the ownership of California State Parks. The Canyon bottom and adjacent north-facing slopes contain diverse riparian woodlands with stands of California bay (*Umbellularia californica*), big-leaf maple (*Acer macrophyllum*), and Fremont cottonwood (*Populus fremontii*) in addition to the more common coast live oak (*Quercus agrifolia*) and western sycamore (*Platanus racemosa*) woodlands. Tributary canyons draining into Topanga, such as Old Topanga, Red Rock, Hondo, and Greenleaf, also support dense native woodlands. The chaparral and coastal sage scrub covering many of the slopes in the Topanga watershed are in good condition and typical of undisturbed brush habitats in the coastal Santa Monica Mountains. Plummer's mariposa lily (*Calochortus plummerae*, CNPS List 1B), Santa Monica Mountains dudleya (*Dudleya cymosa* ssp. *ovatifolia*, Federal Threatened, CNPS List 1B), and Braunton's milk-vetch (*Astragalus brauntonii*, Federal Endangered) have all been recorded from Topanga Canyon, as well as southwestern pond turtle (*Emys marmorata pallida*, California Species of Concern) and southern steelhead (*Oncorhynchus mykiss irideus*, Federal Endangered, California Species of Concern). The Topanga Canyon watershed is one of two remaining watersheds in the Santa Monica Mountains to contain stoneflies (Order Plecoptera), a group of aquatic insects

very sensitive to impacts from siltation and urban runoff. Gertsch's socalchemmis (*Socalchemmis gertschi*), a species of spider discovered in nearby Brentwood Canyon to the east, was described in 2001 and is also known from Topanga Canyon.

APPENDIX C
HISTORIC AND CULTURAL RESOURCES

The Santa Monica Mountains is an area rich in historic and cultural resources, including paleontological, archaeological, and Native American resources. Many of these resources are found on lands under the management of the National Park Service, the California Department of Parks and Recreation, and the Santa Monica Mountains Conservancy. The stewardship and preservation of historic and cultural resources in the Santa Monica Mountains is important for three main reasons:

- Increasing public use, growing pressures for development and deterioration through age and exposure continue to place the Mountains' historic resources at risk.
- It is in the public interest to preserve historic resources because they are irreplaceable and offer cultural, educational, aesthetic, and inspirational benefits.
- The stewardship of historic resources is necessary to deepen cultural and historical awareness as well as to increase the public's understanding of the existing environment.

The National Park Service conducts ongoing research on the history and cultural heritage of the Santa Monica Mountains. Summarized below are some of the major findings of its research.

Paleontological Resources

Paleontological resources, or fossils, are the remains of ancient animals and plants, as well as trace fossils such as burrows, which can provide scientifically significant information on the history of life on earth. Paleontological resources in the Santa Monica Mountains include isolated fossil specimens, fossil sites, and fossil bearing rock units. Fossils of fish, pectinids (scallops), gastropods (single valve mollusks), protists (microbes, including slime molds, protozoa and primitive algae), pelecypods (bivalves), barnacles, and some rare fragments of bone have been recovered from the geologic units that are exposed in the study area. These specimens are scientifically significant, and have yielded information on evolutionary patterns and geographic dispersal of many animal groups within the last 15 million years. This paleontological material has also been useful in the interpretation of paleoenvironmental conditions and the ages of rocks in this area of southern California. The oldest paleontological resources in the Mountains come from the Late Cretaceous Chatsworth formation. Ammonites, extinct mollusks related to the chambered nautilus, have been collected from this formation, as well as marine foraminifera, clams, snails, bryozoans, and shark teeth.

The Santa Monica Mountains area has been the site of marine deposition for much of the Cenozoic period (the last 65 million years). There are a number of tertiary rock units in the mountains known to yield scientifically significant paleontologic resources, including the Topanga, Modelo, and Pico formations. The Topanga formation, a shallow-water marine sandstone unit, contains abundant specimens of gastropods, valves of the giant pectinid (scallop), and about 50 species of mollusks. Bony fish, bivalves, and gastropods have been found in the Calabasas formation.

Paleontological sensitivity varies throughout the Coastal Zone and depends on local geology as well as geomorphic factors. The geology and depositional history of different rock units, in turn largely determines the potential for yielding scientifically or educationally significant fossil remains. Marine sediments, in contrast to terrestrial sediments, often do not contain fossils. This is because they are normally deposited under subaerial conditions, an environment of deposition not conducive to fossil preservation. Table 5 summarizes the rock units and the paleontological sensitivity of those formations within the Santa Monica Mountains Coastal Zone:

Table 5. Rock Formations of the Santa Monica Mountains

Formation	Paleontological Sensitivity
Igneous Rocks	
Conejo Volcanics (Tco, Tcom, Tcosc, Tcor, Tcob, Tcof, Tcop, Tcos)	none
Zuma Volcanics (Tz)	none
Sedimentary Rocks	
Tuna Canyon Formation (Kt)	high
Coal Canyon Formation (Tcc)	high
Sespe Formation (Ts, Tsp)	moderate
Vaqueros Formation (Tv)	high
Topanga Canyon Formation (Tt, Ttc, Ttf, Tts)	high
Calabasas Formation (Tc, Tcmp, Tcn, Tcd, Tclc)	high
Monterey Shale/Modelo Formation (Tm)	high
Trancas Formation (Tr)	high
Llajas Formation (Tll)	high
Intrusive Rocks (Ti)	moderate
Unconsolidated Quaternary Sediments	
Artificial Fill (af)	none
Quaternary Landslide Deposits (Qls)	high
Beach Deposits (Qb)	low
Colluvium (Hills Slope Deposits) (Qc)	low
Alluvial Fan Deposits (Qal, Qalc, Qalp)	low
Valley Fill Deposits (Qt, Qts, Qtm, Qu)	moderate to high

Source: SMMNRA EIS 2000, USGS 2005

Given the high occurrence of paleontological resources within the Coastal Zone Plan Area, individual development projects occurring within sensitive or potentially sensitive rock formations will require site specific surveys and analyses to determine potential impacts and mitigation requirements.

Cultural Resources

The Santa Monica Mountains have been at the heart of cultural activity for thousands of years, affecting cultural processes throughout the region. The indigenous Chumash and Gabrieliño/Tongva peoples, two of the most populous and sophisticated native cultures, have occupied land within the Mountains since prehistoric times. The Chumash people have inhabited the Mountains for nearly 8,000 years, while the Gabrieliño/Tongva people moved into the eastern Santa Monica Mountains about 2,000 years ago. According to ethnographic records and Spanish accounts, the Fernandeño-speaking Native Americans, related to the Gabrieliños, occupied the area east of Topanga Creek, and the Ventureño-speaking Chumash occupied the area to the west. Languages spoken east and west of Topanga Canyon indicate that the study area lies at the border

between two different language and cultural groups. Mission records also document intermarriages between the Gabrieliño and Chumash; thus, it can be expected that a mixture of cultural traits may be represented in the archaeological record in the study area (VFCDEIR, 134). The Native peoples initially practiced a mixed hunting and plant gathering food strategy, emphasizing seed processing over hunting. This shifted towards more of a reliance on ocean resources and an increase in the size and number of permanent villages. Over time, the Chumash and Gabrieliño/Tongva people developed a monetary system and exchange network, establishing more permanent villages along trading routes, referred to as rancherías by the Spanish. They traded extensively among their own villages as well as with neighboring groups. This subsistence pattern and increased trade allowed permanent villages to grow into regional centers, encompassing smaller surrounding communities.

The Chumash and Gabrieliño/Tongva cultures thrived until late 18th century when Spanish missions increasingly encroached upon their lives and livelihood. Exploration of California was initiated by explorers from Spain, Portugal, and Mexico from the 1500s to the 1700s. During the Spanish Colonial period from 1769 to 1822, Spain established a chain of Franciscan missions in California. The first mission in the vicinity of the Santa Monica Mountains was the San Gabriel Mission, established in 1771. Regional missions enlisted the workforce of the Native Americans who voluntary left or were coaxed from their villages, persuaded by food, shelter and clothing, and often were forced to relinquish their indigenous ways.

Around 1800, the Spanish Crown began granting land to retiring Spanish soldiers, much of which was in the Santa Monica Mountains. Many of these granted lands, known as ranchos, were used for cattle ranching and farms and often were worked by the Native Americans. Throughout the 1800s, after winning independence from Spain, the Mexicans continued to distribute mission lands to settlers and grant large tracks of land to private individuals. By the late 19th century, most Native Americans had move to missions or were employed by ranchos, and no longer lived on their ancestral lands. Divided and absorbed into the Spanish mission and ranch system, the Chumash and Gabrieliño/Tongva lost control of their destiny. During the mid to late 19th century, after the Treaty of Hidalgo was signed in 1848 and California was annexed into the United States, much of the area was homesteaded by Americans looking for land. Large ranches were divided into smaller farms to open up more opportunities for families moving to the area, completing the displacement of the Chumash and Gabrieliño/Tongva from their ancestral lands. Throughout the 20th century, much of the land in the Mountains was developed for recreational and commercial uses.

Archaeological Resources

Archaeological resources refer to any material remains of past human life or activities that are of archaeological interest, including Native Archaeological resources such as pottery, basketry, bottles, weapons, weapon projectiles, tools, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal materials, and historic cultural resources such as structures or portions of structures.

An estimated 30 percent of the land throughout the Santa Monica Mountains has been surveyed for archaeological sites. The South Central Coastal Information Center (SCCIC) at California State University Fullerton serves as the repository for archaeological and cultural historic resources within Southern California. Through discussions with SCCIC and past archaeological surveys, it is evident that the Mountains contain many geologic elements that indicate the presence of archaeological resources, such as drainage courses, springs, knolls, rock outcroppings, and oak trees. There are over 1,500 known archaeological sites in the mountains, one of the highest densities of any

mountain range in the world. Additionally, five major plant communities that would have existed as the source of important resources in prehistoric times are still present in the planning area. These plant communities are chaparral, coastal sage scrub, native grasslands, southern oak woodlands, and riparian. Each plant community provided a unique resource to the Native Americans that populated the area. Known native archaeological resources in the Mountains include pictographs, village sites, sacred sites, and special use sites such as ovens and other stone accumulations, including tools and organic remains. Collectively, these sites represent roughly 9,000 years of human use, including burial grounds dating back more than 1,000 years. Such sites document the gradual adaptation of the Chumash and Gabrieliño/Tongva to the region's resources over thousands of years.

The area also contains significant more recent historical artifacts dating back over the past few hundred years, including a cemetery dating from the period 1775 to 1825. Another local site is used by archaeologists as the defining location for early archaic structures in Southern California. With nearly 1,300 homestead claims in the Santa Monica Mountains, in addition to hundreds of structures in the Mountains and in the adjacent foothills, there are numerous features that are considered to be of at least local historical significance, including houses, ranches, and barns. Some are significant for events that occurred there, while others are significant for the individuals who lived there, or are important in terms of architectural history.

Unfortunately, many of the known sites show considerable disturbance due to erosion that results from fire, flood, earthquakes, the effects of human land use practices, and vandalism. In some instances, historic and prehistoric artifacts such as stone tools, antique nails, and equipment parts have been gathered or even destroyed by visitors or residents. Recreation area operations have also negatively impacted historic trails and roads when these trails and roads have been converted to other uses or obliterated.

The long term interaction of the natural landscape and the practices of its inhabitants create the cultural landscape of an area. The Native American Chumash and Gabrieliño/Tongva peoples have occupied land within the Santa Monica Mountains since prehistoric times. During the 19th century, farms and cattle ranches were established and eventually, much of the land was established as recreational and commercial uses. Each cultural landscape contains features that include barns, corrals, fences, farmhouses, archeological sites, roads and trails, water management structures, non-native vegetation and landscaping, all of which provide tangible evidence of the activities and habits of people who occupied, developed, used, and shaped the land to serve their needs.

Impacts

The land use changes proposed under the Coastal Zone Plan result in reduced development intensity compared to what would occur under the 1986 Malibu Land Use Plan. However, future development still has the potential to significantly affect cultural resources. In locations where undeveloped land exists and future development is proposed, unknown and buried prehistoric or historic resources could be affected. It would be expected that areas of known moderate and high paleontological and archaeological sensitivity would be more significantly affected than areas of lesser sensitivity. Each specific development project proposed within the planning area that involves surface disturbances (i.e., grading for project development and infrastructure) carries some potential for significant impacts to these resources. County development review procedures include consideration of all historic and cultural resources, including paleontological, archaeological and

historic, and Native American cultural resources. Mitigation measures are required where it is determined development will adversely impact any of these resources.

APPENDIX D
GEOTECHNICAL RESOURCES

Geologic Setting

The Santa Monica Mountains Coastal Zone is situated within the Transverse Range Geomorphic Province of Southern California. The province includes the Transverse Mountain Ranges and structural basins, which trend approximately east-west. This trend is inconsistent with the majority of Southern California mountain ranges, which typically trend north-south. The Transverse Range Geomorphic Province forms a major structural block of the earth's crust between the San Gabriel and San Andreas faults on the northeast, and the Malibu Coast and Anacapa-Santa Monica faults on the south.

Geological conditions within the Coastal Zone are substantially diverse, with a range of geologic formations. The dramatic topographic relief in the Santa Monica Mountains is a result of differential erosion and plate tectonics. This is evidenced by the hillside, valley, and coastal characteristics found throughout the study area, with elevations ranging from 2,824 feet at Castro Peak to sea level along the coastline. Level topographic areas comprise only a small portion of the total land area. Overall, these conditions reflect north-to-south stresses creating folds (a curve or bend in the strata) and accompanying thrust faults (a fault which results in movement of one rock unit over another). These stresses have been active since at least the middle Miocene time, approximately 22.5 million years ago, when major plate tectonic activity occurred.

Stratigraphy and Formational Description

The Mountains are a complex assemblage of marine and non-marine deposits. Thirteen different rock units are found within the study area as outlined in Table 6: Monterey Shale/Modelo Formation (Tm), Trancas Formation (Tr), Zuma Volcanics (Tz), Intrusive Rocks (Ti), Calabasas Formation (Tc, Tcmp, Tcn, Tcd, Tclc), Conejo Volcanics (Tco, Tcom, Tcosc, Tcor, Tcob, Tcof, Tcop, Tcos), Topanga Canyon Formation (Tt, Ttc, Ttf, Tts), Vaqueros Formation (Tv), Sespe Formation (Ts, Tsp), Llajas Formation (Tll), Coal Canyon Formation (Tcc), Tuna Canyon Formation (Kt), and several Unconsolidated Quaternary Sediments (af, Qal, Qalc, Qalp, Qc, Qb, Qls, Qu, Qt, Qts, Qtm). The rock units range in age from approximately 65 million years old to modern times.

Table 6. Geologic Units of the Santa Monica Mountains Coastal Zone

af	**Artificial Fill** (late Holocene) - Confined mainly to roadways	
Qal	**Alluvium** (late Holocene) **-** Sand, gravel, and silt, confined to active and recently active channels and floodplains	
	Qalc	**Alluvium**-Active channels.
	Qalp	**Alluvium-**Floodplain deposits, mudflow deposits.
Qc	**Colluvium (**Holocene and late Pleistocene) - Silt, clay, and sand, locally with abundant rock fragments; chiefly material that has moved downslope by gravity. Commonly mantles slopes mapped as bedrock to depths of 0.1 to 1 meter but may be as thick as 12 m along coastal slopes. "Parent" material of debris flows generated by soils slips during heavy rainfall.	
Qb	**Beach Deposits** (Holocene) - Fine- to medium-grained sand; rounded pebble gravel locally present.	

Qls	**Landslides and Landslide Deposits** (Holocene and late Pleistocene) - Chiefly deposits but also includes scar areas, resulting from mass wasting by slides, slumps, falls, and flows. "Parent" materials may be bedrock or surficial deposits or both.	
Qu	**Undifferentiated Surficial Deposits** (Holocene and late Pleistocene) **-** alluvium and colluvium; wind-deposited silt and sand.	
Qt	**Coastal Terrace Deposits** (Holocene and late Pleistocene) - nonmarine, alluvium, gravel, silt and clay. Consists of stream terrace and coastal terrace deposits (marine and nonmarine).	
	Qts	**Stream Terrace Deposits** - nonmarine, gravel, sand and silt.
	Qtm	**Coastal Terrace Deposits** - marine, sand, silty sand and gravel.
Tm	**Monterey Shale** (South of Malibu Coast fault) (middle to early Miocene) - Marine shale and siltstone, locally silicious to cherty.	
Tr	**Trancas Formation** (late to middle Miocene) - Marine mudstone, siltstone, and sandstone; underlain by and may intertongue with Zuma volcanics.	
Tz	**Zuma Volcanics** (late to middle Miocene) - Chiefly basaltic and andesitic flows, breccia, pillow lava, tuff, mudflow breccia, volcanic sand and conglomerate, minor mudstone and siltstone interbeds; probably all deposited in a marine environment.	
Ti	**Intrustive Rocks** (middle Miocene) - Basaltic (locally diabasic) and andesitic dikes, sills, and irregular bodies. Intrusive into early middle Miocene and older strata north of Malibu Coast fault.	
	Topanga Group (middle Miocene) **- Divided into:**	
Tc	**Calabasas Formation** - Marine sandstone, interbedded siltstone, silty shale, sedimentary breccia, or conglomerate (proximal turbidites). Includes:	
	Tcmp	**Mesa Peak Breccia Member** - Sedimentary breccia a conglomerate consisting chiefly of angular fragments of basalt and andesite in a matrix of very coarse grained sandstone.
	Tcn	**Newell Sandstone Member** - Sandstone and interbedded platy to shaley siltstone with large dolomitic concretions (proximal turbidites).
	Tcd	**Dry Canyon Sandstone Member** - Sandstone and subordinate interbedded siltstone (proximal turbidites). Intertongues with Malibu Bowl Tongue of Conejo Volcanics in eastern part of Malibu Bowl.
	Tclc	**Latigo Canyon Breccia Member** - Sedimentary breccia.
Tco	**Conejo Volcanics** - Basaltic and andesitic breccia, flows, pillow breccia, aquagene tuff, pillow lava, mudflow breccia, volcanic sandstone, and dark-gray siltstone; probably all depositied in a marine environment. Includes:	
	Tcom	**Malibu Bowl Tongue** - Basaltic andesitic flows and flow breccia.
	Tcosc	**Solstice Canyon Tongue** - Basaltic and andesitic flows, breccia, tuff, and volcanic sandstone.
	Tcor	**Ramirez Canyon Tongue** - Andesitic and basaltic breccia and tuff breccia (probably mudflow breccia in part), flows, and minor volcanic sandstone.
	Tcob	**Volcanic breccia** - Chiefly andesitic and basaltic; thin limestone.
	Tcof	**Flows** - Chiefly basaltic and andesitic, locally contains interbeds of volcanic sandstone with marine fossils and dark-gray platy to shaly siltstone.
	Tcop	Pillow breccia, aquagene tuff, and pillow lava-chiefly basaltic.
	Tcos	Sandstone (volcanic litharenite) and dark-gray platy to shaly siltstone.
Tt	**Topanga Canyon Formation** -Marine sandstone, siltstone, and pebbly sandstone. East of Malibu Canyon divided into:	
	Ttc	**Cold Creek Member** - Marine sandstone, siltstone, and pebbly sandstone.
	Ttf	**Fernwood Member** - Nonmarine sandstone, pebbly sandstone, and mudstone, with minor tuff and limestone.
	Tts	**Saddle Peak Member** - Marine sandstone, pebbly sandstone, and siltstone; pebble-cobble conglomerate at base.
Tv	**Vaqueros Formation** (early Miocene) - Chiefly marine sandstone, minor pebbly sandstone, and interbedded nonmarine mudstone.	
Ts	**Sespe Formation** (late Eocene, Oligocene, early Miocene) - Nonmarine sandstone, pebbly sandstone, conglomerate, and mudstone. Characteristically a redbed sequence, but in some localities red color is absent. Includes:	
	Tsp	**Piuma Member**-Nonmarine grayish-red sandstone, pebbly sandstone, and mudstone, with minor tuff and limestone.
Tll	**Llajas Formation** (middle Eocene) - Marine sandstone and siltstone.	

Tcc	**Coal Canyon Formation** (late Paleocene and Eocene) - Marine sandstone, siltstone, pebbly sandstone, and conglomerate.
Kt	**Tuna Canyon Formation** (Upper Cretaceous) - Marine sandstone with slate chips, siltstone, locally thick cobble conglomerate (turbidite).

Source: Yerkes and Campbell, 1980

Seismic Geologic Hazards

Natural seismic and non-seismic activities in the Santa Monica Mountains contribute to potential hazards faced when developing in the planning area. Two components of seismic activity present a significant hazard: 1) Surface rupturing along fault lines; and 2) Damage to structures due to seismically-induced ground shaking. Other considerations include landslides, liquefaction, and seismically-induced settlement. Soils surveys by agencies such as the Natural Resources Conservation Service identify areas throughout the study area susceptible to landslides and slope failures, particularly during seismic events.

The region contains many faults that have a high potential for seismic activity. The Malibu Coast-Santa Monica-Raymond Hill fault system poses a potentially substantial risk of earthquake damage in the general area. The Simi-Northridge-Verdugo fault system to the north, and the Sycamore Canyon-Boney Mountain System can also significantly impact the planning area. The San Andreas Fault, although located at a greater distance from the study area than the aforementioned faults, also poses a potentially substantial risk to cause seismic damage in the Santa Monica Mountains. The active Malibu Coast Fault, which follows the coastline primarily south of the City of Malibu, is an Alquist-Priolo Earthquake Fault Zone.

Historic Seismic Activity

Although the Coastal Zone lies within a region where large earthquakes have taken place, the study area has not been the epicenter of a large historic earthquake. Local geology makes the region subject to surface rupture during an earthquake along nearby faults, such as the one that occurred in the vicinity of Las Virgenes Road south of Agoura Road in the 1994 Northridge earthquake. Table 7 lists the major seismic activity that has occurred in the region since the late 1800s.

Table 7. Regional Historic Seismic Activity

Earthquake Location	Intensity	Year of Occurrence
Northridge	6.7	1994
Pt. Mugu	5.7	1973
San Fernando	6.5	1971
Wheeler Ridge	7.7	1952
Santa Barbara	5.9	1941
Santa Barbara	6.3	1925
Newhall	6	1893

Source: LSA Associates, Inc., 1996

Seismic activity in the Santa Monica Mountains can have widespread impacts, despite relatively low development densities and the required compliance with current building and safety codes. Earthquakes can cause direct damage to structures, roadways, and utilities, as well as trigger landslides in unstable areas, endangering lives and property. Maps by the California Geological Survey (page D-44) identify many areas in the Santa Monica Mountains with the potential for

earthquake-induced landslides. The 1994 Northridge earthquake triggered more than 1,400 individual landslides within the Mountains (USGS 1995, SMMNRA 2000). It is clear from the Geological Survey maps that large areas susceptible to seismically-induced landslides are also those areas that contain slopes over 25 percent. However, potentially significant hazards exist even without an earthquake due to the prevalence of unstable slopes.

Non-Seismic Geologic Hazards

Non-seismic geologic hazards in the Santa Monica Mountains include slope instability that can contribute to landslides (including rockfalls, landflows, debris flows, and mudflows), liquefaction, and slumping, all of which are normal processes of the Santa Monica Mountains. Landslides within the Coastal Zone as shown on the Geologic Hazards Map consist of two types: 1) Those that have been confirmed to exist; and 2) Those that are suspected to exist, but which are not confirmed. The latter are commonly identified by aerial interpretation only. The Santa Monica Mountains are naturally prone to landslides due to a combination of unstable steep slopes and often poorly cemented sedimentary rock. There are several confirmed and probable bedrock landslides throughout the planning area. More than 2,000 quaternary landslide deposits are still apparent in the Santa Monica Mountains and the Simi Hills. These events are exacerbated not only by seismic activity but also by slopes over 25 percent, by grading, vegetation removal, increased soil saturation, and the additional runoff resulting from development in the Mountains' watersheds.

Landslides of many types have occurred and continue to occur in the hillside and mountainous portions of the area, despite the best efforts of geologists and civil engineers. Within the planning area, the finer grained portions of those formations most susceptible to deep-seated landsliding are also usually the most prone to mudslides, slumps, and erosion, and have been known to occur where cut and fill slopes were inadequately constructed. Historically, mudflows are most common during or shortly after a heavy rainfall or series of rainfalls, and can occur with great suddenness and destructive force. Debris flows are a type of landslide that occur with some regularity in the Santa Monica Mountains. They occur where there are sufficient sediments (debris flow deposits) that mix with water to form a thick slurry of water, soil, and rock that has the potential for great destructive power. Though debris flows are a natural process in the study area, conditions suitable for their occurrence are exacerbated by disturbance of soil, slopes, or vegetation, as well as channelized waterways and impervious materials that increase the amount of runoff. Rockfalls are generally associated with seismic ground shaking, rock blasting for development, and rain washing out soil containing large rocks and boulders. Rockfalls are a potential hazard for developments at the base of those steep slopes that contain fractured rock outcroppings or large exposed boulders. Soil slumping is a slower process that can cause extensive structural damage, although it typically is not as immediately life-threatening as other soil stability hazards. In addition, manufactured slopes steeper than 2:1 have experienced slope instability. Development in proximity to unstable slopes is strictly regulated, as these slopes constitute a significant threat to life, property, and public safety.

Liquefaction can be described as a "quicksand" condition in which there is a loss of foundation support caused by a shock – typically an earthquake of significant magnitude. Technically, this condition results from a sudden decrease in the resistance of a cohesionless soil (such as sand) accompanied by a temporary increase in pore water pressure. Important factors in determining liquefaction potential are the intensity and duration of shaking, coupled with the presence of relatively low density fine sand and silt in an area of shallow groundwater. The potential for liquefaction has been identified in areas with alluvium and shallow groundwater. Low-lying areas

with relatively loose soils – primarily alluvium (In the study area: af, Qal, Qalc, Qalp, Qc, Qb, Qls, Qu, Qt, Qts, Qtm) – have a high potential for liquefaction. These areas are shown on the Geologic Hazards Map.

Another type of liquefaction, which occurs at some depth from the surface, can result in ground lurching (movement of earth along a fault trace), fissuring (separation of land along a fault trace), or cracking. These effects are ascribed to flow landsliding or lateral spreading landslides, which can occur at very low angles. Areas having the highest relative liquefaction potential are considered primarily to be alluvial areas having groundwater depths less than about 30 feet and possibly up to 50 feet. Given the local bedrock geology and depth to groundwater within the planning area, liquefaction potential is considered low. However, seasonal fluctuations in rainfall, as well as the effects of development, can cause the local water table to rise, thereby increasing the potential for liquefaction to occur.

In the absence of a shallow water table, but with soil conditions otherwise ideal for liquefaction, an earthquake may cause soil consolidation. The degree of settlement depends on the intensity of shaking and the looseness of the soil. This compacting process would damage structures primarily where there is significant differential settlement within a short distance; for example, in alluvial valleys or where a structure was built partially on bedrock and partially on fill. Areas subject to this hazard must be identified on a project-by-project basis.

Another important concern is the shrink-swell behavior and erosiveness of clay-rich soils found throughout the Mountains, typically in the Topanga, Modelo, and Conejo Volcanics formations. Ungraded native lowland soils exhibit the highest potential for shrinkage and swelling, and must be removed or extensively modified prior to development. The Natural Resources Conservation Service and others have identified soil types that are particularly susceptible to this behavior and to subsidence and hydrocompaction. Development is likely to be constrained in areas with these difficult soil conditions. Table 8 provides further details on development constraints. Soil erosion typically results from concentrated runoff on unprotected slopes or in stream channels. Undeveloped hillside and mountainous areas may also experience substantial erosion from runoff whenever the vegetation cover is destroyed by fire or grading operations, or removed for brush clearance.

Local seepage problems and poor soil percolation are other areas of concern in the Santa Monica Mountains. Surfacing groundwater that causes boggy ground or heavy rains that give rise to ephemeral springs may occur locally due to barriers to subsurface water flow. Seepage problems will commonly occur where porous rock overlies non-porous sediments, a condition occurring throughout the Coastal Zone. New grading activities may also encounter other springs or seepage areas. In most instances, surfacing water is a nuisance rather than a hazard to building sites or slope stability. Nevertheless, the need for mitigation measures during development should be anticipated in potentially affected areas.

The soil and bedrock formations typically found in the region have very poor water percolation rates because of their generally fine-grained or indurated (cemented) nature, particularly those composed of Conejo Volcanics. The most significant development constraint or hazard resulting from poor soil percolation would be limitations on the feasibility of certain onsite wastewater treatment systems, and the potential for creating slope stability problems.

Structural Integrity

Most older buildings that have been damaged by earthquakes were built lacking sufficient reinforcement. The County requires that current building designs and construction materials withstand certain levels of ground shaking during earthquakes. These requirements are based on site-specific soil and geologic conditions, as well as on the level of risk associated with potential damage to the building. Construction techniques for all buildings, once environmental protection policies are met, are regulated either by the most recent State of California Uniform Building Code, or by requirements increased as necessary to reduce geologic and seismic risks to acceptable levels. County development review procedures also evaluate soil erosion and require appropriate mitigation when necessary.

Geotechnical Limitations

A geologic map of an area shows what geologic formations may be found there. Further site analysis must be conducted to evaluate other factors that may indicate geologic constraints to development. The material strength of rock or soil, slope angle, climate, vegetation, and time all determine slope stability, and play a significant role in controlling driving or resisting forces. These factors together determine the geotechnical limitations of a site. Although two neighboring parcels of land may have similar geologic composition, it is possible for them to have different geologic constraints and conditions. The Los Angeles County Department of Public Works (DPW) requires all applicants to do a seismic slope analysis on all slopes that they believe may pose a safety risk or other significant issues. Upon review of the analysis, DPW makes recommendations and suggests mitigation measures to the applicant.

Table 8 lists adverse conditions due to geologic factors that may affect the general areas and neighborhoods within the Coastal Zone as noted; some conditions may or may not apply to specific property and some conditions affecting a specific property may not be identified:

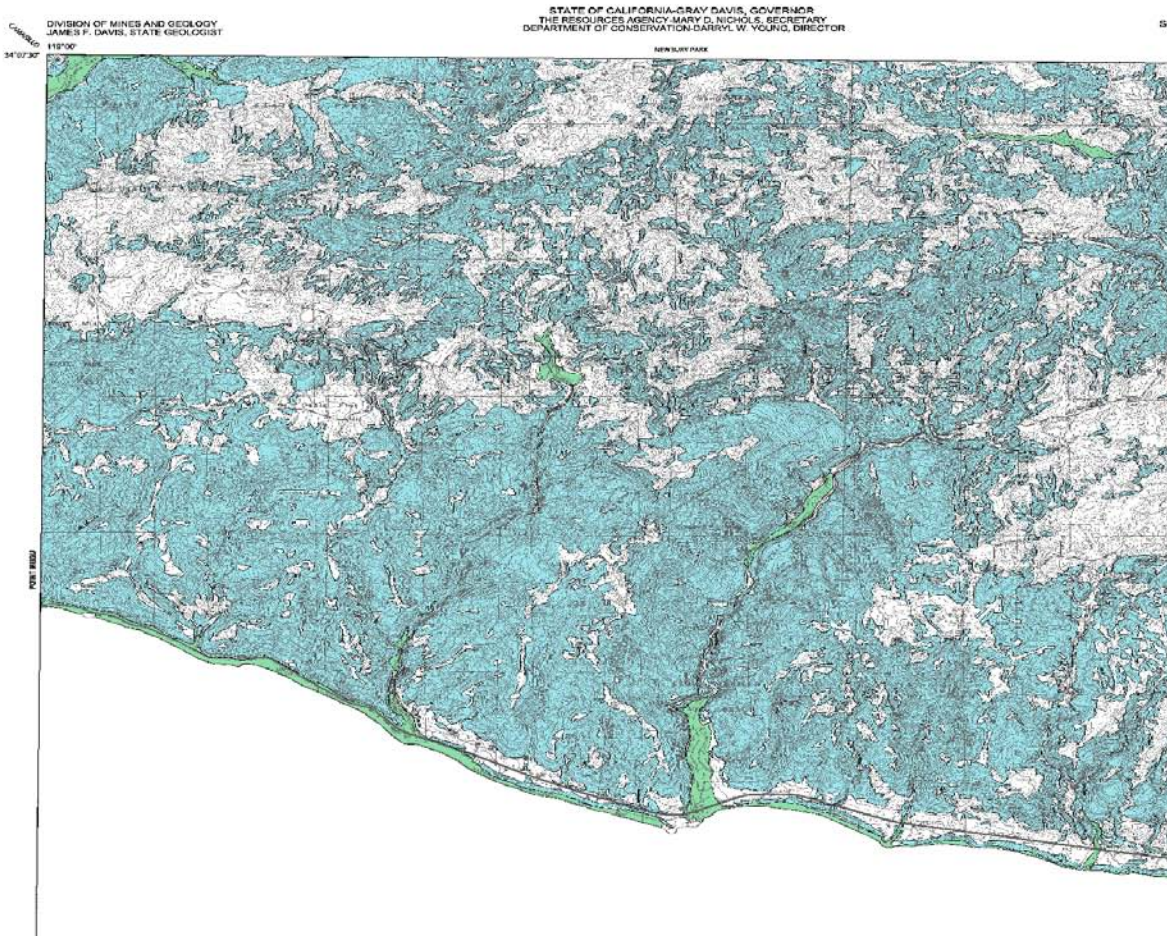
Table 8. General Locations of Adverse Conditions Caused by Geologic Factors

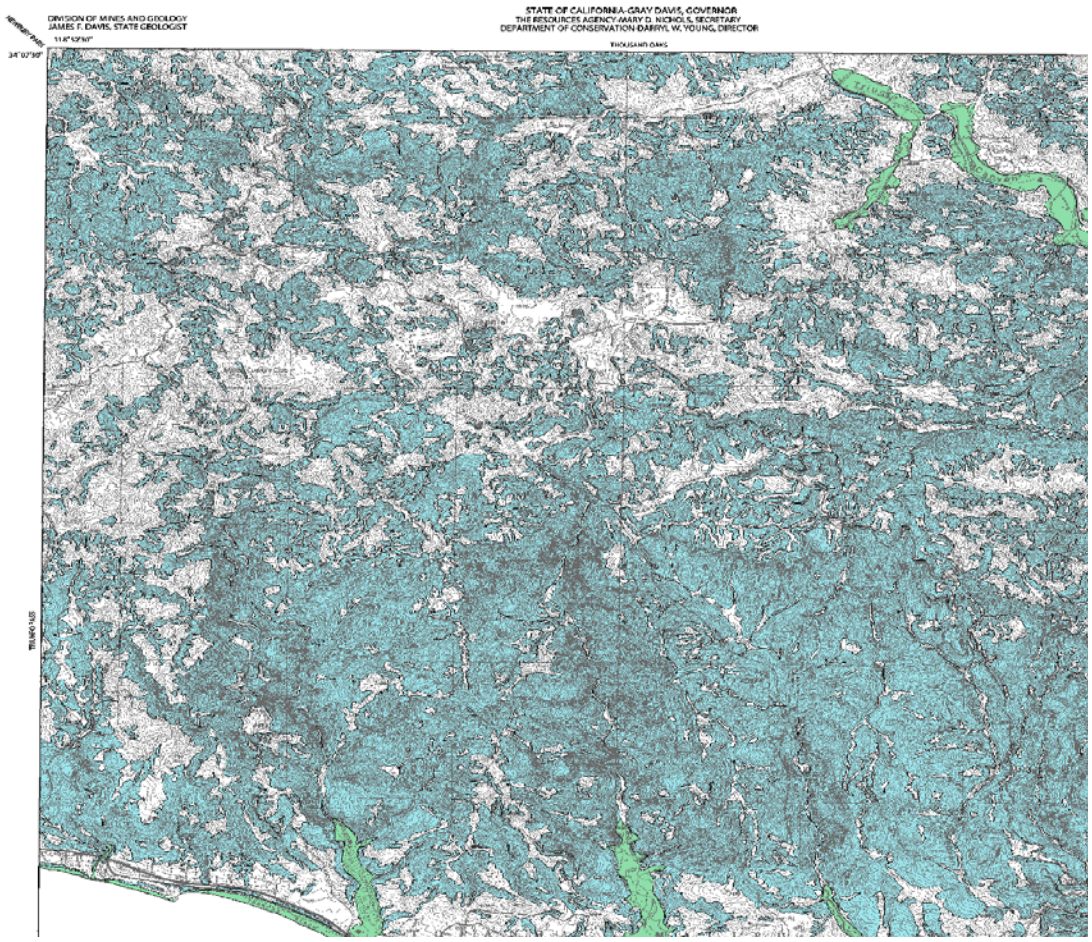
Topanga:	
Old Topanga Canyon Road to CA State Park:	Numerous large landslides; daylighted bedding°; locally steep slopes; elevated groundwater*
Fernwood:	Large mapped landslides; daylighted bedding°; steep slopes
Saddle Peak Road:	Some steep slopes; landslides; daylighted bedding°
Tuna Canyon Road:	Landslides; daylighted bedding°; some steep slopes
Old Topanga Canyon:	Surficial instability; elevated groundwater*; some landslides
Topanga Skyline loop:	Numerous landslide, some recently active; adverse bedding; steep slopes
Malibu:	
Sunset Mesa:	Steep descending slopes; landsliding; thick fill and/or poorly consolidated terrace deposits
Piuma Road to Schueren Road:	Some large landslides; poor percolation in Sespe Formation*
Rambla Pacifico/Las Flores Canyon:	Active landsliding; steep slopes; elevated groundwater

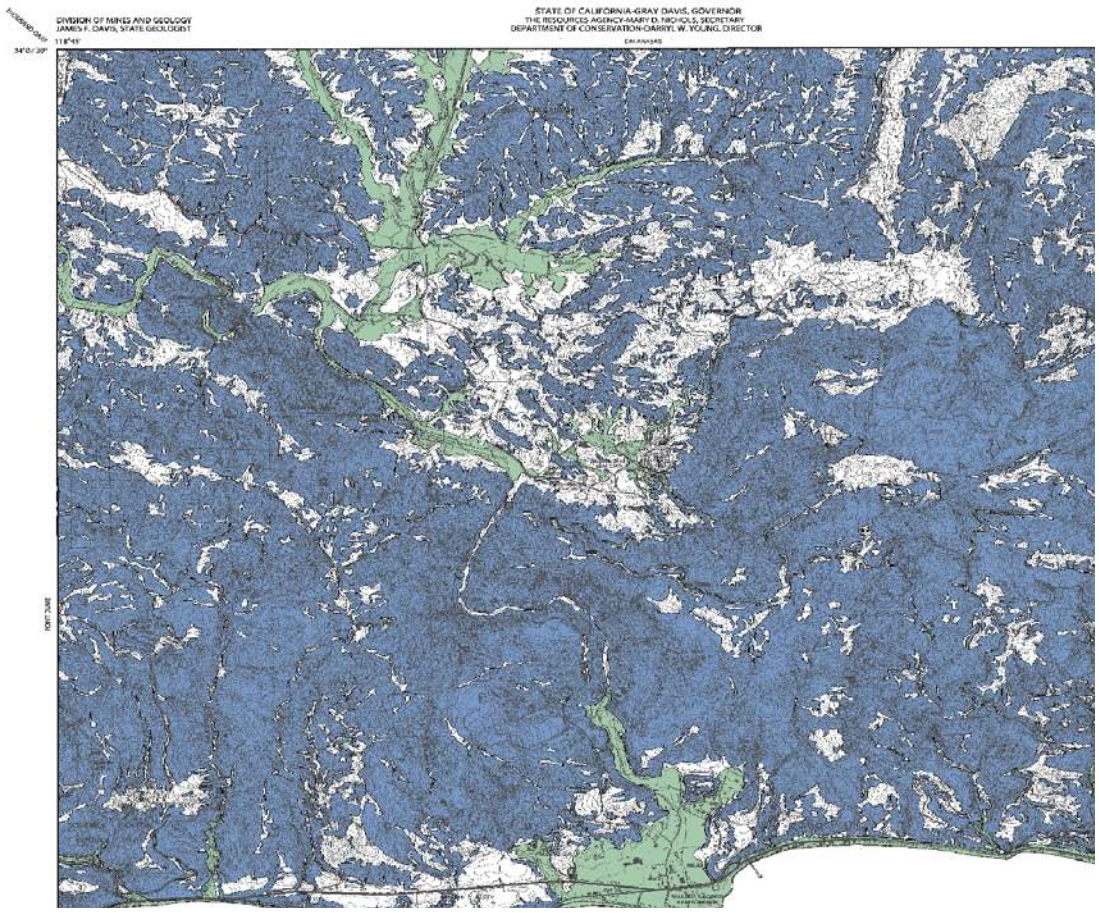
	possibly exacerbating conditions
Stunt Road:	Large mapped landslide; rockfall hazard
Corral Canyon – El Nido; Malibu Bowl:	Daylighted bedding°; steep slopes; mapped landslides
Latigo Canyon:	Daylighted bedding°; steep slopes; mapped landslides
Latigo Canyon – Vicinity of Ocean View Drive:	Large mapped landslide; steep slopes
Mulholland Highway: Kanan Road to PCH:	Volcanic bedrock; variable percolation rates; some landslides
Kanan Dume Road:	Intermittent volcanic bedrock and sedimentary rock; adverse bedding possible; steep slopes
Encinal Canyon:	Volcanic bedrock; daylighted bedding° when in sedimentary rock
Decker Canyon:	Primarily volcanic bedrock
Calabasas:	
Mulholland Highway – City of Calabasas to Stunt Road:	Daylighted bedding°; expansive soils/bedrock
Mulholland Highway – Stunt Road to Las Virgenes Road/Malibu Canyon:	Volcanic bedrock; some steep slopes
Stokes Canyon:	Potential adverse bedding; expansive soils/bedrock; debris flow potential; elevated groundwater*
Monte Nido: Cold Canyon Road to Piuma Road:	Volcanic bedrock; elevated groundwater*
Agoura:	
Mulholland Highway: Las Virgenes Road/Malibu Canyon to Kanan Road	Primarily volcanic bedrock; some areas subject to rockfall hazard
Malibu Lake	Volcanic bedrock; elevated groundwater at lower elevations*

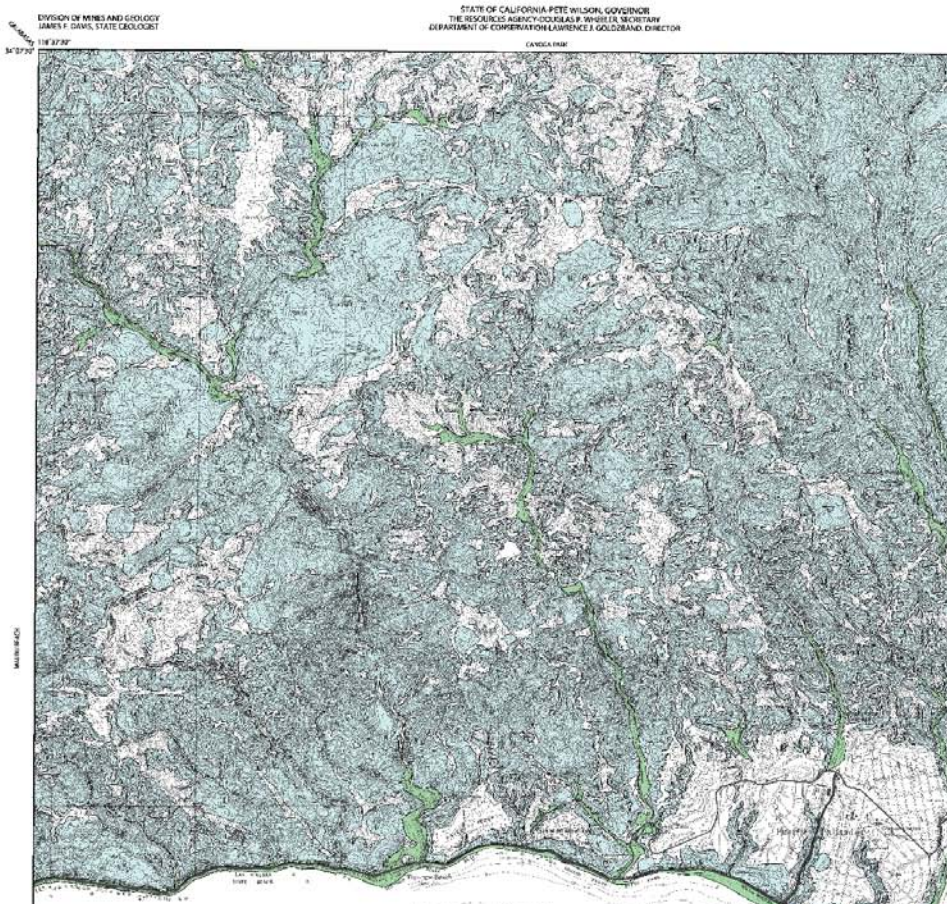
°Daylighted bedding occurs where a slope is steeper than a planar feature, such as layers of bedrock or bedding, and the planar feature is exposed within that slope, resulting in an unsupported surface. When this condition is present, the likelihood of landsliding along this slope may be increased and was often the cause of an existing landslide or may cause future landslides.

*Could affect percolation rates.


DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST
STATE OF CALIFORNIA-GRAY DAVIS, GOVERNOR
THE RESOURCES AGENCY-MARY D. NICHOLS, SECRETARY
DEPARTMENT OF CONSERVATION-DARRYL W. YOUNG, DIRECTOR
NEWBURY PARK


DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST
STATE OF CALIFORNIA-GRAY DAVIS, GOVERNOR
THE RESOURCES AGENCY-MARY D. NICHOLS, SECRETARY
DEPARTMENT OF CONSERVATION-DARRYL W. YOUNG, DIRECTOR
THOUSAND OAKS


DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST
STATE OF CALIFORNIA-GRAY DAVIS, GOVERNOR
THE RESOURCES AGENCY-MARY D. NICHOLS, SECRETARY
DEPARTMENT OF CONSERVATION-DARRYL W. YOUNG, DIRECTOR


DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST
STATE OF CALIFORNIA PETE WILSON, GOVERNOR
THE RESOURCES AGENCY DOUGLAS P. WHEELER, SECRETARY
DEPARTMENT OF CONSERVATION LAWRENCE J. GOLDZBAND, DIRECTOR

APPENDIX E
SIGNIFICANT RIDGELINES

The natural beauty of the Santa Monica Mountains is widely recognized as one of its most distinctive and valuable attributes, making it a primary attraction to residents, visitors, and businesses. Visitors enjoy a number of local and regional recreation trails as well as scenic driving routes that meander through the Mountains, including at least one officially designated county scenic highway. The dramatic topography, with rugged sandstone-covered peaks, chaparral-covered hillsides, and extensive ridgelines that dominate the landscape, greatly contribute to the unique beauty of the area and constitute a valuable scenic resource due to their high visibility from many vantage points. Significant Ridgelines are defined as the line formed by the meeting of the tops of sloping surfaces of land. In general, Significant Ridgelines are designated based on their proximity to scenic routes and trails, the role they serve in maintaining the character and quality of developed neighborhoods, and to preserve the overall unique character of the landscape of the Santa Monica Mountains Coastal Zone.

Given the proximity of development to the Coastal Zone Plan area's abundant scenery, any form of physical alteration on or close to the top of a Significant Ridgeline has immediate and noticeable effects. The visual impact of building, grading, or merely removing vegetation can be just as dramatic as the natural features themselves. In some parts of the Santa Monica Mountains, development on private land has shown little concern for the protection of scenic resources such as Significant Ridgelines, effectively obliterating any scenic qualities. Coastal Act provisions state that the scenic and visual resources of the Coastal Zone are to be protected and that new development must be sited in a manner so as to preserve these resources.

Development activity resulting in the following impacts would be considered to have an adverse effect on the aesthetic resources associated with Significant Ridgelines:

- Development activity that would encroach into regionally or locally significant skylines and ridgelines. This might include structures that would be visible along the ridgeline, and grading that would modify ridgeline landforms or result in the removal of natural vegetation along the ridgeline.

- Development of natural open space considered to have high natural aesthetic values. This would include land development projects ranging from those of a rural character to those with a suburban intensity, and would apply primarily to areas that are apart from existing development.

Significant Ridgelines were selected through a point evaluation system based on the following criteria:

a) Topographic complexity: Ridges that have a significant difference in elevation from the valley or canyon floor;

b) Near/far contrast: Ridges that are a part of a scene that includes a prominent landform in the foreground and a major backdrop ridge with an unbroken skyline;

c) Cultural landmarks: Ridges that frame views of well-known locations, structures, or other places which are considered points of interest in the Santa Monica Mountains Coastal Zone;

d) Overall integrity of the surrounding and adjacent mountain system;

e) Uniqueness and character of a specific location: Peaks and their adjoining ridges;

f) Existing community boundaries and gateways: Ridges and surrounding terrain that provide the first view of predominantly natural, undeveloped land as a traveler emerges from the urban landscape;

g) The ridgeline frames a view of the ocean or large expanse of sky;

h) The ridgeline is visible from a Scenic Route; and

i) The ridgeline is visible from an official public trail.

Each criterion was rated on a scale from 1 to 4. Table 9 describes each criterion within the context of each point evaluation level. Table 10 lists the selected ridgelines and the points received for each criterion. Those ridgelines that received five or more points of 3 or 4 were designated as Significant Ridgelines. Of the sixty-seven ridgelines that were evaluated, forty-seven ridgelines received the number of 3- and 4-point evaluations necessary to be designated Significant Ridgelines. The Significant Ridgelines are identified on the Significant Ridgelines map following this section, and in Map 3 Scenic Elements, included as part of the Land Use Plan.

Table 9. Significant Ridgeline Point Evaluation Criteria

Point Evaluation	Topographic Complexity	Near/Far Contrast	Cultural Landmark	Overall Integrity	Uniqueness and Character	Existing Community Boundary or Gateway	Silhouettes Sky or Ocean View	Visible From Scenic Route	Visible from Public Trail (identified from map)
4 - Very High	Sharp elevation contrasts between ridgelines and canyons or valley floors	Great contrasts of scale, detail, and perspective between foreground, middleground, and background	Ridgeline is part of a widely-accepted cultural landmark, such as Saddle Rock, Ladyface Mountain, or coastline	Visually part of greater mountain system that contains no grading, vegetation disturbance or other indication of human presence	Highly unique features, such as sandstone peaks or dramatic rock formations, or ridgeline frames an exceptional view	Ridgeline strongly defines the boundary between developed communities or jurisdictions or establishes a visual gateway between different areas of Coastal Zone	Ridgeline dramatically frames the ocean or large expanse of sky from a public road	Ridgeline is clearly visible from both directions along a designated Scenic Route	Ridgeline is clearly visible from or overlays one or more official public trails
3 - High	Typical mountain geography, lacking jagged tops or steep features	Moderate contrasts	Ridgeline is in the same viewshed as a widely-accepted landmark or part of an important scenic area	Contains some human disturbance or minor development	Part of or framing an unusual view offered from more than one location	Ridgeline somewhat defines the boundary between communities or jurisdictions, or may be considered part of a gateway	Ridgeline frames a slight view of the ocean or expanse of sky from a public road	Ridgeline is clearly visible from one direction along a Scenic Route	Ridgeline is visible from parts of, is surrounded by, or runs adjacent to one or more official public trails
2 - Medium	Moderately varied terrain with broad slopes, valleys, and hills	Little contrast; view is dominated by either foreground, middleground or background	Ridgeline is in close proximity to a widely-accepted landmark	Contains a significant amount of human disturbance and development	Part of a common view found throughout the area	May be considered as a community divider	Ridgeline frames the sky from intermittent locations along a public road	Ridgeline is slightly visible from a Scenic Route	Ridgeline is visible from or runs perpendicular to an official public trail
1 - Low	Unvaried terrain with large, flat expanses and no distinguishable landforms	No contrast; topography is level within the viewshed	Ridgeline has no association with a cultural landmark	Ridgeline is part of a very disturbed and developed landscape	Does not contribute to or frame any unique view	No part in defining community boundaries or gateways	Ridgeline does not frame any ocean or sky view	Ridgeline is not visible from a Scenic Route	There are no official public trails near the ridgeline

Table 10. Ridgeline Criteria Evaluation

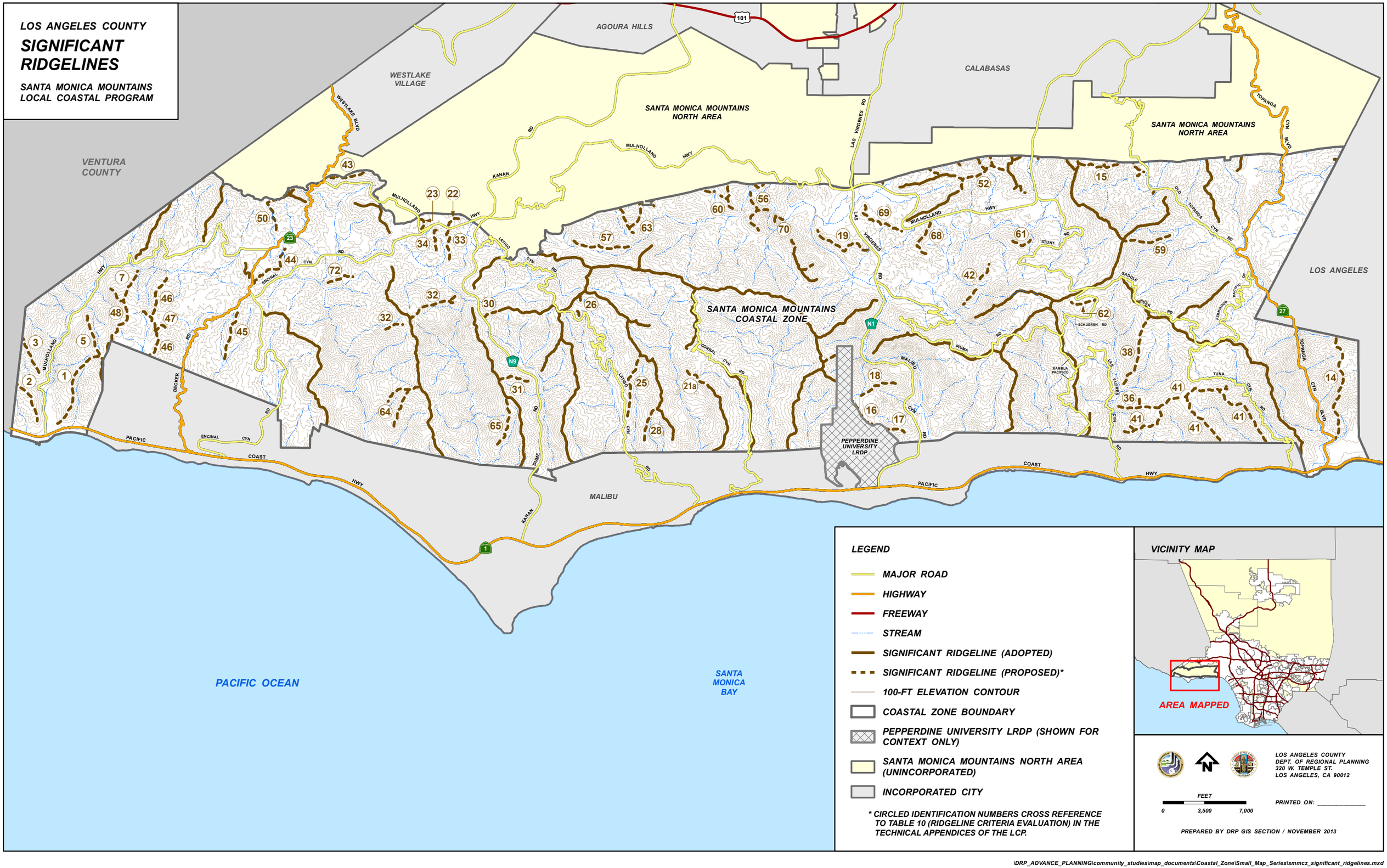
Number on Map	Topographic Complexity	Near/Far Contrast	Cultural Landmark	Overall Integrity	Uniqueness and Character	Existing Community Boundary or Gateway	Frames Sky or Ocean View	Visible From Scenic Route	Visible from Official Public Trail	Five or More Points of 3 or 4
1	2	2	3	4	2	4	3	4	4	X
2	2	1	3	4	1	4	3	4	4	X
3	2	1	3	1	4	3	4	4	4	X
5	3	2	1	4	2	3	3	4	4	X
6	2	2	1	4	2	3	2	4	1	
7	3	2	1	3	3	3	3	4	4	X
8	1	1	1	4	1	1	2	4	1	
11	2	2	1	3	2	3	3	3	3	X
12	2	1	1	2	2	2	2	2	4	
13	2	2	1	2	2	3	3	3	3	
14	4	4	3	4	4	4	4	4	4	X
15	4	4	4	4	4	2	1	4	4	X
16	2	3	1	3	3	3	3	4	2	X
17	3	3	1	3	3	3	2	4	2	X
18	3	3	3	4	4	2	2	4	2	X
19	2	3	3	3	2	2	1	4	3	X
20	1	2	1	3	2	2	2	3	4	
21	2	3	2	3	3	3	2	1	2	
21a	2	2	1	4	2	3	4	4	4	X
22	2	4	4	3	3	2	2	4	2	X
23	3	4	4	2	3	2	1	4	2	X
24	2	3	1	3	2	2	2	4	2	
25	2	3	1	3	2	3	3	4	4	X
26	2	3	1	2	2	3	3	4	3	X
27	2	3	1	2	1	2	3	4	2	
28	2	2	1	3	2	3	3	4	4	X
29	2	3	1	4	1	1	2	3	1	
30	2	1	3	2	2	3	3	4	4	X
31	2	2	2	2	3	3	3	4	4	X
32	3	4	3	4	3	3	4	4	3	X
33	3	3	3	2	3	2	4	4	2	X

Number on Map	Topographic Complexity	Near/Far Contrast	Cultural Landmark	Overall Integrity	Uniqueness and Character	Existing Community Boundary or Gateway	Frames Sky or Ocean View	Visible From Scenic Route	Visible from Official Public Trail	Five or More Points of 3 or 4
34	2	3	3	3	3	2	3	4	4	X
36	2	2	1	4	2	3	4	4	3	X
38	4	4	1	4	3	3	4	4	4	X
~~39~~	~~2~~	~~2~~	~~1~~	~~3~~	~~2~~	~~3~~	~~3~~	~~4~~	~~4~~	~~X~~
40	3	1	2	2	3	2	2	4	2	
41	3	2	2	3	3	4	4	4	4	X
42	3	3	2	3	3	2	1	3	3	X
43	3	3	3	3	4	4	4	4	4	X
44	2	2	1	3	2	3	3	4	4	X
45	2	2	1	3	2	3	4	4	4	X
46	2	3	1	2	2	3	4	4	3	X
47	3	3	1	3	2	2	3	1	3	X
48	3	3	2	4	3	4	4	4	4	X
49	2	2	1	3	2	2	4	4	3	
50	2	3	1	3	2	3	3	4	4	X
51	2	3	1	2	1	2	3	1	4	
52	2	3	1	3	2	4	4	4	4	X
53	1	2	1	2	2	3	3	4	3	
54	2	2	1	2	1	2	1	4	3	
55	2	2	1	3	2	2	1	2	4	
56	2	2	1	3	3	3	3	4	4	X
57	3	4	3	3	3	2	4	4	3	X
58	2	2	1	3	2	4	2	1	4	
59	2	3	3	3	2	2	3	1	4	
60	2	2	2	3	2	3	3	3	4	X
61	2	3	1	3	2	4	3	2	3	X
62	2	2	4	2	3	2	4	4	4	X
63	3	3	4	4	4	4	3	4	3	X
64	3	3	2	3	2	3	2	2	4	X
65 *	3	2	3	4	4	3	1	1	2	X
66	3	2	3	3	3	1	2	1	2	

* Unable to Evaluate in the Field

Number on Map	Topographic Complexity	Near/Far Contrast	Cultural Landmark	Overall Integrity	Uniqueness and Character	Existing Community Boundary or Gateway	Frames Sky or Ocean View	Visible From Scenic Route	Visible from Official Public Trail	23 or Above
68	3	3	1	4	3	3	3	4	4	X
69	1	3	3	3	2	3	3	4	3	X
70	3	3	3	4	3	1	0	4	3	X
71	2	1	2	2	1	3	1	3	4	
72	2	2	0	3	1	4	3	4	4	X
73	1	1	0	3	2	2	3	3	4	

LOS ANGELES COUNTY
SIGNIFICANT RIDGELINES
SANTA MONICA MOUNTAINS LOCAL COASTAL PROGRAM



LEGEND

- MAJOR ROAD
- HIGHWAY
- FREEWAY
- STREAM
- SIGNIFICANT RIDGELINE (ADOPTED)
- SIGNIFICANT RIDGELINE (PROPOSED)*
- 100-FT ELEVATION CONTOUR
- COASTAL ZONE BOUNDARY
- PEPPERDINE UNIVERSITY LRDP (SHOWN FOR CONTEXT ONLY)
- SANTA MONICA MOUNTAINS NORTH AREA (UNINCORPORATED)
- INCORPORATED CITY

* CIRCLED IDENTIFICATION NUMBERS CROSS REFERENCE TO TABLE 10 (RIDGELINE CRITERIA EVALUATION) IN THE TECHNICAL APPENDICES OF THE LCP.

VICINITY MAP

LOS ANGELES COUNTY
DEPT. OF REGIONAL PLANNING
320 W. TEMPLE ST.
LOS ANGELES, CA 90012

FEET
0 3,500 7,000

PRINTED ON: _____

PREPARED BY DRP GIS SECTION / NOVEMBER 2013

\DRP_ADVANCE_PLANNING\community_studies\map_documents\Coastal_Zone\Small_Map_Series\smmcz_significant_ridgelines.mxd

APPENDIX F
AIR QUALITY

Setting

The Santa Monica Mountains lie within the South Coast Air Basin (Basin) and serve as an airshed for the Southern California metropolitan area. The Basin is a 6,600-square-mile area bounded by the Pacific Ocean on the west and the San Gabriel, San Bernardino, and San Jacinto Mountains on the north and east. The South Coast Air Quality Management District (AQMD) is the regional agency responsible for air quality monitoring and air pollution control within the Basin.

The topography and climate of Southern California combine to create an area of high air pollution potential in the Basin. During the summer months, a warm air mass frequently descends over the cool, moist marine layer produced by the interaction between the ocean's surface and the lowest layer of the atmosphere. The warm upper layer forms a cup over the cool marine layer, which prevents pollution from dispersing upward. This inversion allows pollutants to accumulate within the lower layer. The lack of winds during the summer further limits ventilation from occurring.

Due to the low average wind speeds in the summer and a persistent daytime temperature inversion, emissions of hydrocarbons and oxides of nitrogen have an opportunity to combine with sunlight in a complex series of reactions. These reactions produce a photochemical oxidant commonly known as "smog." Because the Basin experiences more days of sunlight than any other major urban area in the U.S. except Phoenix, the smog potential in the region is higher than in most other major metropolitan areas in the country. Since the 1940s, air quality measurements taken in urban Los Angeles have been among the worst in the country. In particular, the South Coast Air Basin is in extreme non-attainment for ozone, serious non-attainment for carbon monoxide, and serious non-attainment for small particulate matter under 10 microns (PM_{10}).

Air quality in the vicinity of the Santa Monica Mountains varies widely as a result of physiography, climatological conditions, the location or presence of an inversion layer, distance from the coast, and the amount of pollutants emitted into the atmosphere. The Santa Monica Mountains lie along a route for air exchange between coastal and inland valley areas. In the absence of large-scale influences, a daily sea breeze/drainage flow - characterized by afternoon breezes flowing from the sea inland, followed by late evening/early morning breezes from land to sea - dominates local wind patterns. The afternoon winds, which are generally strongest during the summer, flow northward and can reach average speeds of 8 to 12 miles per hour. The late evening/early morning winds generally flow to the south. These drainage winds are strongest in the winter season and average 5 miles per hour. Overall, coastal areas experience better air quality than inland interior valleys and the Santa Monica Mountains exhibit better air quality than the urban landscape.

Sources of Air Pollution

There are two main sources of air pollution in the Santa Monica Mountains: vehicular traffic and construction and grading activities. The largest existing sources of pollutants within the area are vehicles on the local roadway network. In particular, heavy-duty diesel engines - trucks and buses -

release unburned hydrocarbons, carbon monoxide (CO), sulfur oxides, nitrogen oxides (NO_x), particulate matter, and other toxic compounds. Although diesel trucks and buses account for only a small amount of hydrocarbon emissions and carbon monoxide emissions, they contribute large amounts of NO_x and particulates.

Air pollution from construction may include diesel emissions from heavy construction equipment and fugitive dust emissions from grading and other ground disturbing activities. Compliance with AQMD rules and regulations, including Rule 403, would minimize the emission of air pollutants from construction activities and stationary sources. Air quality impacts during construction would be short-term and would be minimized due to the implementation of air pollutant control measures required by these rules and regulations. Because the Coastal Zone Plan identifies future permitted land uses and does not include specific development proposals, construction-related emissions of individual future projects cannot be quantified at this time. Project-specific environmental analysis would be required for future development projects, which may provide additional measures to further reduce air quality impacts during construction.

Two other sources of air pollution are wildfires and prescribed burns. Wildfires are one of many natural sources of particulate matter. Particulate matter is the main pollutant of concern from smoke because it can cause serious health problems. Smoke can also adversely affect the clarity (visual range) of the air. A large-scale fire can significantly increase air levels of carbon monoxide and other pollutants. The amounts depend upon its size, the fuels burning, moisture content of those fuels, topography, and meteorological conditions. Most of the particulate matter produced in wildfires is respirable, meaning it is small enough to pass through the upper respiratory system and enter the lungs. Acute smoke impacts include eye, mucous membrane and respiratory tract irritation, aggravation of chronic respiratory and cardiac disease, and reduced lung function.

Prescribed burns affect local air quality for short periods of time, with air quality returning to normal levels once the burning is completed. Particulate matter is the primary air pollutant from prescribed burns, and may cause short term localized impacts on visibility or serious health effects to sensitive individuals. The use of prescribed fire for land management purposes is regulated by the California Air Resources Board (ARB) under the jurisdiction of the AQMD. The use of backing fires, wind patterns that disperse smoke away from sensitive areas, fuel moisture conditions which promote rapid burnout, and good smoke management plans, all help limit the air pollution contributions from prescribed burns.

Air Quality Standards

Air quality in the Santa Monica Mountains is regulated by several agencies including the U.S. Environmental Protection Agency (EPA), the ARB, and the AQMD. The EPA has established primary and secondary National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), respirable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and lead (Pb), which are referred to as criteria air pollutants. The primary standards protect public health and the secondary standards protect public welfare. The ARB has established California Ambient Air Quality Standards (CAAQS) for these same pollutants, as well as sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particulates, which in most cases are more stringent than the NAAQS. Table 11 summarizes current federal and state ambient air quality standards. The standards are designed to protect the most sensitive persons from illness or discomfort with a margin of safety.

Table 11. Air Pollution Sources, Effects, and Standards

Air Pollutant	State Standard	Federal Standard	Sources	Primary Effects
Ozone (O_3)	0.09 ppm, 1-hour average	0.12 ppm, 1-hour average; 0.08 ppm, 8-hour average	Atmospheric reaction of organic gases with nitrogen oxides in sunlight.	Aggravation of respiratory and cardiovascular diseases; irritation of eyes; impairment of cardiopulmonary function.
Carbon Monoxide (CO)	9.0 ppm, 8-hour average; 20 ppm, 1-hour average	9.0 ppm, 8-hour average; 35 ppm, 1-hour average	Incomplete combustion of fuels and other carbon-containing substances such as motor vehicle exhaust; natural events, such as decomposition of organic matter.	Reduced tolerance for exercise; impairment of mental function; impairment of fetal development; death at high levels of exposure; aggravation of some heart diseases; reduced visibility.
Nitrogen Oxides (NO_X)	0.25 ppm, 1-hour average	0.053 ppm, annual average	Motor vehicle exhaust; high-temperature stationary combustion; atmospheric reactions.	Aggravation of respiratory illness; reduced visibility; reduced plant growth; formation of acid rain.
Sulfur Dioxide (SO_2)	0.25 ppm, 1-hour average; 0.05 ppm, 24-hour average with ozone ≥ 0.10 ppm, 1-hour average or TSP ≥ 100 $\mu g/m^3$, 24-hour average	0.03 ppm, annual average; 0.14 ppm, 24-hour average	Combustion of sulfur-containing fossil fuels; smelting of sulfur-bearing metal ores; industrial processes.	Aggravation of respiratory diseases (asthma, emphysema); reduced lung function; irritation of eyes; reduced visibility; plant injury; deterioration of metals, textiles, leather, finishes, coatings, etc.
Respirable Particulate Matter (PM_{10})	30 $\mu g/m^3$, annual geometric mean; > 50 $\mu g/m^3$, 24-hour average	50 $\mu g/m^3$, annual arithmetic mean; 150 $\mu g/m^3$, 24-hour average	Stationary combustion of solid fuels; construction activities; industrial processes; atmospheric chemical reactions.	Reduced lung function; aggravation of the effects of gaseous pollutants; aggravation of respiratory and cardio-respiratory diseases; chest discomfort; reduced visibility.
Lead	1.5 $\mu g/m^3$, 30-day average	1.5 $\mu g/m^3$, calendar quarter	Contaminated soil.	Increased body burden; impairment of blood formation and nerve conduction; behavioral and hearing problems in children.

$\mu g/m^3$ = micrograms per cubic meter of air; ppm – parts per million parts of air, by volume.

Source: CEQA Air Quality Handbook, South Coast Air Quality Management District.

Sensitive Receptors

Certain population groups are especially sensitive to air pollution and should be given special consideration when evaluating air quality impacts from projects. These groups include children, the elderly, persons with pre-existing respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. As defined in the AQMD *CEQA Air Quality Handbook* (1993), a sensitive receptor to air quality is defined as any of the following land use categories: (1) long-term health care facilities; (2) rehabilitation centers; (3) convalescent centers; (4) retirement homes; (5) residences; (6) schools; (7) parks and playgrounds; (8) child care centers; and (9) athletic fields.

Air Quality Monitoring

The Santa Monica Mountains Coastal Zone is located within Source/Receptor Area (SRA) 2 (Northwest Coastal Los Angeles County). This SRA is one of 38 designated areas under the jurisdiction of the AQMD. Communities within a given SRA are expected to have similar climatology, traffic levels, and local point sources of emissions. Subsequently, similar ambient air pollutant concentrations are expected within any given SRA. Unfortunately, fine particulate matter is not monitored within SRA 2. The Southwest Coastal monitoring station (SRA 3) is the next closest station and collects data on particulate matter. The most current six years of data monitored at these two stations are included in Table 12.

Overall, air quality in Northwest Coastal Los Angeles County has improved over the past six years, with the maximum levels of carbon monoxide, nitrogen dioxide, and inhalable particulates on the decline since 1999. The levels of ozone have fluctuated over the past six years, but have improved since 2003.

Table 12. Ambient Air Quality Monitoring Summary, Northwest Coastal Los Angeles/ Southwest Coastal Los Angeles Monitoring Stations[1]

Pollutant/Standard	Number of Days Thresholds Were Exceeded and Maximum Levels During Such Violations					
	1999	2000	2001	2002	2003	2004
Ozone						
Days exceeding:						
State 1-Hour ≥ 0.09 ppm	4	2	1	1	11	5
Federal 1-Hour > 0.12 ppm	0	0	0	0	1	0
Federal 8-Hour > 0.08 ppm	0	0	0	0	1	1
Maximum levels:						
Maximum 1-Hour Conc. (ppm)	0.117	0.104	0.099	0.118	0.134	0.107
Maximum 8-Hour Conc. (ppm)	0.082	0.079	0.080	0.077	0.105	0.089
Carbon Monoxide						
Days exceeding:						
State 8-Hour > 9.0 ppm	0	0	0	0	0	0
Federal 8-Hour ≥ 9.5 ppm	0	0	0	0	0	0
Maximum level:						
Maximum 8-Hour Conc. (ppm)	3.6	4.3	4.0	2.7	2.7	2.3

Table 12. (continued) Ambient Air Quality Monitoring Summary, Northwest Coastal Los Angeles/ Southwest Coastal Los Angeles Monitoring Stations[1]

Pollutant/Standard	Number of Days Thresholds Were Exceeded and Maximum Levels During Such Violations					
	1999	2000	2001	2002	2003	2004
Nitrogen Dioxide						
Days exceeding:						
State 1-Hour ≥ 0.25 ppm	0	0	0	0	0	0
Maximum level:						
Maximum 1-Hour Conc. (ppm)	0.13	0.16	0.11	0.11	0.12	0.09
Inhalable Particulates						
Days exceeding:						
State 24-Hour > 50 μg/m³	6	9	8	12	3	2
Federal 24-Hour > 150 μg/m³	0	0	0	0	0	0
Maximum level:						
Maximum 24-Hour Conc. (μg/m³)	69	74	75	121	58	52

[1] Ozone, carbon monoxide, and nitrogen dioxide are as monitored at the Northwest Coastal Los Angeles County station. Particulate matter is as monitored at the Southwest Coastal station; particulate matter is not measured at the Northwest Coastal station.

ppm: parts per million; μg/m³: micrograms per cubic meter

Source: South Coast Air Quality Management District, 2005.

Air Quality Impacts

Development through 2025 consistent with the land use policies of the proposed Coastal Zone Plan could result in the addition of approximately 1,400 units to the Coastal Zone Plan area's existing housing stock of 2,700 units, for a total of 4,100 units. This is based on the County's projection that approximately 56 units would be built annually in the Coastal Zone between 2000 and 2025.

Construction Impacts

Future development in the Coastal Zone will generate construction-related air quality impacts associated with the following activities: 1) construction equipment exhaust emissions; 2) dust from grading and earth-moving operations; 3) emissions from worker vehicles traveling to and from construction sites; and 4) volatile organic compounds (VOC) emissions from the application of architectural coatings and solvent usage. Construction related air quality impacts will occur periodically throughout the life of the Coastal Zone Plan. Because the Coastal Zone Plan identifies future land uses and does not contain specific development proposals, construction related emissions are speculative and cannot be accurately determined at this stage of the planning process. Thus it is appropriate to require individual development projects to assess the potential significance of construction emissions at subsequent levels of planning and environmental review.

Nevertheless, construction emissions may be estimated for residential projects that would be allowed under the proposed Coastal Zone Plan. A review of grading permits issued in the area over the past three years reveals that approximately 14 permits are issued annually for residential projects, including single-family residences and accessory uses. Using the methodology outlined in the

AQMD *CEQA Air Quality Handbook*, the daily construction emissions associated with grading for 14 housing units have been estimated and are shown below in Table 13. It is assumed that a maximum of 280,000 square feet or 6.4 acres of land would be graded on any given day because each of the 14 homes is anticipated to have a graded surface of 20,000 square feet.

Table 13. Typical Peak Grading Day Construction Emissions

Number and Equipment Type	Hours of Operation	Pollutants (Pounds/day)				
		CO	ROG	NO_x	SO_x	PM_{10}
14 – Off-Highway Trucks	8	201.6	21.3	467.0	50.4	29.1
7 – Track-type Loaders	8	11.3	5.3	46.5	4.3	3.3
7 – Wheeled Dozers	8	100.8	10.6	--[1]	19.6	9.2
7 – Scrapers	8	70.0	15.1	215.0	25.8	23.0
Worker Commute Exhaust[2]		17.5	1.7	2.4	--[3]	--[3]
Subtotal Exhaust Emissions		**401.2**	**54.1**	**731.0**	**100.0**	**64.6**
Fugitive Dust Emissions						
Open Stockpile[4]						55.0
Dirt/Debris Pushing[5]						348.8
Graded/Exposed Surface[6]						169.7
TOTAL GRADING WITHOUT MITIGATION		**401.2**	**54.1**	**731.0**	**100.0**	**638.1**
Threshold		**550**	**75**	**100**	**150**	**150**
Significant?		**NO**	**NO**	**YES**	**NO**	**YES**

Note: Emission factors provided by South Coast Air Quality Management District, *CEQA Air Quality Handbook* (1993), Tables A9-8-A and A9-9.

Assumptions:

1. NO_X emission factor was not available for wheeled dozers.
2. Based on 44 miles round trip commute length for 42 workers.
3. Negligible amount.
4. Emissions from 28,000 square feet of open stockpiles.
5. Emissions by 2 dozers operating 8 hours a day each.
6. Emissions from 6.4 acres of graded/exposed surface.

Grading and construction activities would cause combustion emissions from utility engines, heavy-duty construction vehicles, haul trucks, and vehicles transporting the construction crew. Exhaust emissions during grading and construction activities within individual development sites will vary daily at each site as construction activity levels change. It is assumed that building construction would not begin until after mass grading on any project site is completed. Therefore, there would be no overlap in emissions from grading or building/construction within a project site. It is to be expected, however, that grading on one or more development sites will overlap construction on one or more other sites. In general, the peak grading days of a development project would generate larger amounts of air pollutants than during peak building construction days.

Fugitive dust emissions are generally associated with demolition, land clearing, exposure, vehicle and equipment travel on unpaved roads, and dirt/debris pushing. Dust generated during construction activities would vary substantially depending on the level of activity, the specific operations, and weather conditions. Nearby sensitive receptors and workers may be exposed to blowing dust, depending upon prevailing wind conditions.

The AQMD estimates that each acre of graded surface creates about 26.4 pounds of PM_{10} per workday during the construction phase of the project and 21.8 pounds of PM_{10} per hour from dirt/debris pushing per dozer. It is assumed that up to a maximum of 6.4 acres of land would be graded on any one day and that two dozers would be used up to eight hours a day each. A total of 28,000 square feet of open stockpiles would occur on the 14 project sites, which would generate 55 pounds per day (ppd) of PM_{10}. Therefore, approximately 638 pounds of PM_{10} per day would be generated from soil disturbance without mitigation during peak construction phase. This level of dust emission would exceed the AQMD threshold of 150 pounds per day.

It is assumed further that a total of 42 workers would be working on the 14 project sites. Assuming an average 44-mile round trip commute length for each worker, emissions from the daily 1,848 miles travel by worker commute would generate 17.5 ppd of CO, 1.7 ppd of ROG, and 2.4 ppd of NO_x. Emissions of SO_x and PM_{10} from vehicle exhaust and tire wear are negligible. As shown in Table 14, peak grading day construction equipment emissions would exceed the AQMD thresholds for NO_x and PM_{10}. Emissions of other criteria pollutants would be below the thresholds.

Architectural coatings contain VOCs that are part of the ozone precursors. Because there is insufficient information at this time for future projects, the VOC emissions associated with architectural coatings are not calculated. Emissions associated with architectural coating can be reduced by using pre-coated/natural colored building materials, water-based or low-VOC coating, and using coating transfer or spray equipment with high transfer efficiency. Compliance with AQMD Rules and Regulations for architectural coatings would reduce this potential impact to a less than significant level.

Individual development projects within the Coastal Zone will be required by law to comply with regional air quality rules, which would assist in reducing the short-term air pollutant emissions. AQMD Rule 403 requires that fugitive dust be controlled with best available control measures so that the presence of such dust does not remain visible in the atmosphere beyond the property line of the emission source. In addition, Rule 402 requires the implementation of dust suppression techniques to prevent fugitive dust from creating a nuisance off site. Implementation of these techniques can reduce the fugitive dust generation (and thus the PM_{10} component) by 50 to 75 percent. Compliance with Rules 402 and 403 would reduce impacts on nearby sensitive receptors.

Operational Impacts

After housing units are built and occupied, emissions would be generated by both stationary and mobile sources on a regular, day-to-day basis. Stationary emissions would be generated primarily as a result of natural gas consumption, landscape maintenance, and consumer products, such as aerosol sprays and barbeque lighter fluid. Mobile source emissions would be generated by motor vehicles traveling to, from, and within the Coastal Zone Plan area. Table 14 reports the estimated air pollution emissions associated with an increase of 1,400 units in the housing stock, from 2,700 units in 2000 to 4,100 units in 2025. Future pollutant emissions were calculated using the URBEMIS (urban emissions) model.

Table 14. Estimated Air Pollutant Emissions Associated with an Increase in the Housing Stock (Pounds per Day)

Pollutant	Housing Stock in 2000 (2,700 units)	Housing Stock in 2025 (4,100 units)	Difference[1]	Percent Change	AQMD Thresholds	Significant Impact?
Carbon Monoxide (CO)	4,706	962	(3,744)	-80%	550	No
Reactive Organic Gases (ROG)	528	303	(225)	-43%	55	No
Nitrogen Oxides (NO_x)	415	123	(292)	-70%	55	No
Particulate Matter less than 10 microns (PM_{10})	219	320	101	46%	150	No

[1]Numbers in parentheses indicate a reduction in emissions.

Source: URBEMIS 2002 Model conducted by Department of Regional Planning staff, November 2005.

As shown above, in spite of new development within the Coastal Zone Plan area and the region, long-term pollutant emissions are projected to decrease between 2000 and 2025 for all pollutants except PM_{10}. This can be explained by several factors including (but not limited to):

- Effective ongoing efforts of the AQMD to improve the Basin's air quality, such as incentives and enforcement of rules/regulations;
- Phase-out of older automobiles from the vehicle fleet;
- Improvement of vehicle emissions-control technology, particularly within diesel vehicles; and
- Better control of VOC release from all sources.

Between 2000 and 2025, the level of PM_{10} is projected to increase by 46 percent. PM_{10} typically originates from the stationary combustion of solid fuels, construction activities, and atmospheric chemical reactions. A possible explanation for PM_{10} increasing over the next 20 years is a lack of specific legal control measures for this pollutant. However, this increase would not exceed the AQMD threshold of 150 pounds per day.

Mitigation

The following measures have been shown to mitigate air quality impacts from development activity:

- Require that all new development comply with applicable AQMD construction emissions rules and regulations.
- Enforce the following at construction sites to reduce fugitive dust emissions:
    a. Require trucks hauling soil, dirt, sand, and other emissive materials to cover their loads.
    b. Require the suspension of all grading operations when wind speeds (as instantaneous gusts) exceed 25 miles per hour.

    c. Enclose, cover, water when necessary, or apply approved soil binders, according to manufacturers' specifications, to exposed stock piles, specifically gravel, sand, and dirt.
    d. Require the installation of truck wheel washers and other types of barriers at construction sites to prevent the transport of soil onto public rights-of-way.
    e. Encourage developers to maintain the natural topography to the extent possible to eliminate the need for extensive land clearing, blasting, ground excavation, grading, and cut and fill operations.
- Require all contractors to:
    a. Maintain construction equipment in peak operating condition so as to reduce operation emissions.
    b. Use low-sulfur diesel fuel in all equipment.
    c. Use electric equipment whenever practicable.
    d. Shut off engines when equipment is not in use for more than five minutes.
- Require the use of vegetative cover, windbreaks, and improved tillage practices to minimize fugitive dust from agricultural uses.
- Encourage the use of building materials and methods that minimize the emissions of reactive organic gases and particulate.
- Require stationary air pollution sources, such as gasoline stations, restaurants with charbroilers and deep fat fryers, to comply with or exceed applicable AQMD rules and control measures.
- Enforce regulations against illegal fires.
- Create the maximum possible opportunities for bicycles and horses as alternative transportation modes and recreational uses.
- Support the development of alternative fuel infrastructure that is publicly accessible.
- Cooperate and participate in the development and implementation of regional air quality management plans, programs and enforcement measures.

APPENDIX G
TRANSPORTATION STUDY

Background

In March 2006 the Los Angeles County Department of Public Works (DPW) completed an updated transportation study for the Ventura Corridor area, which includes the Santa Monica Mountains Coastal Zone. The study area is bounded on the north and west by Ventura County and the City of Thousand Oaks; on the south by the Pacific Ocean; and on the east by the City of Los Angeles and Topanga Canyon State Park.

DPW developed a model that was used to analyze current traffic deficiencies and identify congested areas. The model output was for a selected base year (2005) validated by comparing traffic volumes anticipated by the model to actual counts. The model was then expanded to forecast future (2030) traffic conditions by assuming that the General Plan highway network would be in place and that the area would be built out in accordance with local general plans; that is, the Santa Monica Mountains North Area Plan and the Coastal Zone Plan. Socioeconomic variables, such as population, employed residents, and available employment data were calculated based on the land uses designated in each zone. The study area was then divided into traffic analysis zones (TAZ), which are geographic subareas that facilitate the characterization of different parts of a study area. These socioeconomic data provided a basis for estimating trip generation by identifying levels of employment and population densities in each TAZ within the study area. The expanded model was then used to predict future circulation deficiencies.

Highway Network

The highway network is a computerized representation of the major street and highway system within the study area. Data was collected regarding the existing standards for the roadways currently serving the area.

The geographical and operational characteristics of each segment of roadway are contained in the network database. These characteristics include length, speed, capacity, number of lanes, and standard classification.

Only key roads, arterial highways, and freeways are included in the network. However, local streets and driveways for major commercial developments are replicated in the model by the use of centroid connectors. A centroid is an assumed point in a TAZ that represents the origin or destination of all trips to or from the TAZ and a centroid connector links the TAZ to the model highway network.

Model Assumptions

Several field reviews in 1993 of the model study area revealed special considerations that are still viable and need to be addressed in the current base year (2005) model. These special considerations are as follows:

- Malibu Canyon Road: The average daily traffic (ADT) capacity assigned to this road was increased from 9,000 vehicles per day (vpd) (standard for a major highway) to 13,000 vpd each direction. The peak hour capacity was raised from 1,000 vehicles per hour (vph) to 1,300 vph each direction to replicate actual operational conditions observed in the field.

- Topanga Canyon Boulevard: The ADT capacity assigned to this road was increased from 8,000 vpd (standard for a secondary highway) to 12,000 vpd each direction. The peak hour capacity was raised from 850 vph to 1,200 vph each direction to replicate actual operational conditions observed in the field.

Congestion Summary

Degree of congestion is ascertained by looking at volume-to-capacity (v/c) ratios. Various agencies define levels of congestion based on these ratios. For the purpose of this study, the degrees of congestion are as follows: a ratio greater than 1.00 would generally be considered severely congested. Ratios in the range of 0.85 to 1.00 are considered to be congested.

The modeled base year (2005) cumulative congestion areas for daily and morning (AM) peak hour scenarios are shown in Table 15 below. As shown below, locations of year 2005 traffic congestion include segments of the following roadways: Malibu Canyon Road, Mulholland Highway, Pacific Coastal Highway, and Topanga Canyon Boulevard. The study did not identify any congestion areas within the Coastal Zone for afternoon (PM) peak hour scenarios.

Table 15. Locations of Year 2005 Traffic Congestion within the Coastal Zone

	Roadway	Location
Morning Peak Hour	Malibu Canyon Road	Southbound from Mulholland Highway to Civic Center Way
	Pacific Coast Highway	Eastbound from Civic Center Way to the eastern boundary of Coastal Zone Plan area
	Topanga Canyon Boulevard	Southbound from Mulholland Highway to Pacific Coast Highway
Average Daily Traffic (ADT)	Malibu Canyon Road	Northbound from south of Piuma Road to Mulholland Highway
	Mulholland Highway	Eastbound from Mulholland Drive to Topanga Canyon Boulevard
	Pacific Coast Highway	Eastbound from just west of Topanga Canyon Boulevard to the eastern boundary of the Coastal Zone Plan area

Planning studies often use a horizon date of approximately 20 years in the future. The year 2030 designation does not imply that full buildout of the area will occur by 2030, but represents a useful horizon year for planning the area's transportation needs.

The 2030 land use data was compiled to account for all possible development under the two local general plans, the North Area Plan, and the Coastal Zone Plan. The data compiled took into account all proposed, tentative, and approved developments as well as approved plan amendment developments as of mid-2005.

Based upon the highway network and socioeconomic factors, a deficiency analysis for the Future Year 2030 scenario was performed to determine the expected congested areas of the roadway network. As with the deficiency analysis performed for the base year (2005) conditions, these expected areas of congestion can then be studied in more detail to determine causes and possible solutions to each problem. The projected year (2030) cumulative congestion areas for average daily, morning, and afternoon peak hour scenarios are shown in Table 16 below.

Table 16. Locations of Projected Year 2030 Traffic Congestion within the Coastal Zone

	Roadway	Location
Morning Peak Hour	Malibu Canyon Road	Southbound from Mulholland Highway to Civic Center Way
	Pacific Coast Highway	Eastbound from Civic Center Way to Topanga Canyon Boulevard. Both directions from Topanga Canyon Boulevard easterly to the Coastal Zone Plan area boundary
	Topanga Canyon Boulevard	Southbound from just south of Mulholland Highway to Pacific Coast Highway
Afternoon Peak Hour	Malibu Canyon Road	Southbound from Mulholland Highway to Civic Center Way
	Pacific Coast Highway	Both directions from the study area boundary to Topanga Canyon Boulevard
	Topanga Canyon Boulevard	Southbound from Fernwood Pacific Drive to Pacific Coast Highway
Average Daily Traffic (ADT)	Malibu Canyon Road	Both directions from Mulholland Highway to Piuma Road and northbound from just north of Civic Center Way to Piuma Road
	Mulholland Highway	Both directions from Cornell Road to Las Virgenes Road
	Pacific Coast Highway	Both directions from Civic Center Way eastbound to the eastern boundary of the Coastal Zone Plan area

According to the study, traffic conditions will worsen between 2005 and 2030. As shown above, locations of projected year 2030 traffic congestion include segments of the following roadways: Malibu Canyon Road, Mulholland Highway, Pacific Coastal Highway, and Topanga Canyon Boulevard. While the study did not identify any congestion areas within the Coastal Zone for afternoon peak hour scenarios in 2005, three were identified for the year 2030: Malibu Canyon Road, Pacific Coast Highway, and Topanga Canyon Boulevard.

APPENDIX H
STORMWATER POLLUTION MITIGATION BEST MANAGEMENT PRACTICES

Many pollutants are introduced into watersheds through water that runs off from developed areas. The runoff picks up materials such as oil, transmission fluid, cleansers, animal waste, and pesticides from driveways, streets, and landscaping. This polluted runoff reaches Santa Monica Bay and the Pacific Ocean, contributing to the impairment of those waters. These pollutants can have significant impacts on the ability of fauna such as amphibians and fish to reproduce viable offspring, the ability of locally-indigenous vegetation to remain healthy, and can present a significant health risk to humans.

These materials are a part of modern life. It is when they are used or disposed of improperly that they become a pollutant and a hazard. While it is probably not possible to eliminate these materials from the environment, it is imperative to reduce their impact on the natural environment. The impacts can be reduced by utilizing the following three management strategies:

1. Site design
2. Source control
3. Treatment control

Site design involves practices such as minimizing impervious surfaces, physically directing runoff to landscaping that acts as a filter for the pollutants, and retaining natural vegetation and topography.

Source control involves preventing the introduction of materials into the environment through minimizing the exposure of these materials to rainfall or irrigation.

Treatment control utilizes various practices to trap water and remove pollutants soon after their introduction to the environment, preventing widespread impacts.

The following are a list of management practices designed to implement the three management strategies discussed above. These best management practices (BMPs), compiled from the Department of Public Works, the Environmental Review Board, and industry practices, should be incorporated into all development projects, whether for a new single-family residence or for a landscape remodel. Many of the BMPs may be incorporated into existing development and landscaping with minimal expense. All BMPs must be utilized consistent with County zoning and building codes and other applicable regulations.

Site Design BMPs

Minimizing Impervious Areas

- Reduce sidewalk widths
- Incorporate landscaped buffer areas between sidewalks and streets.

- Design residential streets for the minimum required pavement widths
- Minimize the number of residential street cul-de-sacs and incorporate landscaped areas to reduce impervious cover.
- Use open space development that incorporates smaller lot sizes
- Increase building density while decreasing the building footprint
- Reduce overall lot imperviousness by promoting alternative driveway surfaces and shared driveways that connect two or more homes together
- Reduce overall imperviousness associated with parking lots by providing compact car spaces, minimizing stall dimensions, incorporating efficient parking lanes, and using pervious materials in spillover parking areas

Increase Rainfall Infiltration

- Use permeable materials for private sidewalks, driveways, parking lots, and interior roadway surfaces (examples: hybrid lots, parking groves, permeable overflow parking, etc.)
- Direct rooftop runoff to pervious areas such as yards, open channels, or vegetated areas, and avoid routing rooftop runoff to the roadway or the urban runoff conveyance system

Maximize Rainfall Interception

- Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs

Minimize Directly Connected Impervious Areas (DCIAs)

- Draining rooftops into adjacent landscaping prior to discharging to the storm drain
- Draining parking lots into landscape areas co-designed as biofiltration areas
- Draining roads, sidewalks, and impervious trails into adjacent landscaping

Slope and Channel Protection

- Planting native or drought-tolerant vegetation on slopes
- Use of natural drainage systems to the maximum extent feasible
- Energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels
- Stabilizing permanent channel crossings

Maximize Rainfall Interception

- Cisterns
- Foundation planting

Increase Rainfall Infiltration

- Dry wells

Source Control BMPs

- Storm drain system stenciling and signage
- Regular street and parking lot sweeping
- Outdoor material and trash storage area designed to reduce or control rainfall runoff
- Efficient irrigation system

Treatment Control BMPs

Biofilters

- Grass swale
- Grass strip
- Wetland vegetation swale
- Bioretention

Detention Basins

- Extended/dry detention basin with grass lining
- Extended/dry detention basin with impervious lining

Infiltration Basins

- Infiltration basin
- Infiltration trench
- Porous asphalt
- Porous concrete
- Porous modular concrete block

Wet Ponds and Wetlands

- Wet pond (permanent pool)
- Constructed wetland

Drainage Inserts

- Oil/Water separator
- Catch basin insert
- Storm drain inserts
- Catch basin screens

Filtration Systems

- Media filtration
- Sand filtration

Hydrodynamic Separation Systems

- Swirl Concentrator
- Cyclone Separator

APPENDIX I
STATEMENT OF DEFENSE FORM

A person may engage in activity in the Coastal Zone that requires a coastal development permit from the County without first having obtained the permit, or in activity that may be inconsistent with a coastal development permit previously issued by the County. In these instances, the director may issue an order directing that person to cease and desist such activity, and may issue a restoration order. The Statement of Defense form provides that person a way to respond in writing to the cease and desist or restoration order.

Statement of Defense Form

DEPENDING ON THE OUTCOME OF FURTHER DISCUSSIONS THAT OCCUR WITH THE DEPARTMENT OF REGIONAL PLANNING ENFORCEMENT STAFF AFTER YOU HAVE COMPLETED AND RETURNED THIS FORM, (FURTHER) ADMINISTRATIVE OR LEGAL ENFORCEMENT PROCEEDINGS MAY NEVERTHELESS BE INITIATED AGAINST YOU. IF THAT OCCURS, ANY STATEMENTS THAT YOU MAKE ON THIS FORM WILL BECOME PART OF THE ENFORCEMENT RECORD AND MAY BE USED AGAINST YOU.

YOU MAY WISH TO CONSULT WITH OR RETAIN AN ATTORNEY BEFORE YOU COMPLETE THIS FORM OR OTHERWISE CONTACT THE DEPARTMENT OF REGIONAL PLANNING ENFORCEMENT STAFF.

This form is accompanied by either a cease and desist order or restoration order issued by the director or a notice of intent to initiate cease and desist order or restoration order proceedings before the Regional Planning Commission. This document indicates that you are or may be responsible for or in some way involved in either a violation of County code provisions or of a coastal development permit. The document summarizes what the (possible) violation involves, who is or may be responsible for it, where and when it (may have) occurred, and other pertinent information concerning the (possible) violation.

This form requires you to respond to the (alleged) facts contained in the document, to raise any affirmative defenses that you believe apply, and to inform the staff of all facts that you believe may exonerate you of any legal responsibility for the (possible) violation or may mitigate your responsibility. This form also requires you to enclose with the completed statement of defense form copies of all written documents, such as letters, photographs, maps, drawings, etc. and written declarations under penalty of perjury that you want the Regional Planning Commission to consider as part of this enforcement hearing.

You should complete the form as fully and accurately as you can and as quickly as you can and return it no later than _____ to the Department of Regional Planning's enforcement staff at the following address:

Department of Regional Planning
320 West Temple Street, 13th Floor
Los Angeles, CA 90012

If you have any questions, please contact as soon as possible _____ of the Department of Regional Planning enforcement staff at telephone number (213) 974-6483.

1. Facts or allegations contained in the cease and desist order or the notice of intent that you admit (with specific reference to the paragraph number in such document):

2. Facts or allegations contained in the cease and desist order or notice of intent that you deny (with specific reference to the paragraph number in such document):

3. Facts or allegations contained in the cease and desist order or notice of intent of which you have no personal knowledge (with specific reference to the paragraph number in such document):

4. Other facts which may exonerate or mitigate your possible responsibility or otherwise explain your relationship to the possible violation (be as specific as you can; if you have or know of any document(s), photograph(s), map(s), letter(s), or other evidence that you believe is/are relevant, please identify it/them by name, date, type, and any other identifying information and provide the original(s) or (a) cop(y/ies) if you can):

5. Any other information, statement, etc. that you want to offer or make:

6. Documents, exhibits, declarations under penalty of perjury or other materials that you have attached to this form to support your answers or that you want to be made part of the administrative record for this enforcement proceeding (Please list in chronological order by date, author, and title and enclose a copy with this completed form):