ATLAS

of

Sensitive Species

of the

Morro Bay Area

AARON E. SIMS

IN COLLABORATION WITH TECHNICAL ADVISORS

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WITH THE ASSISTANCE OF PROJECT MANAGERS

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Created Jointly by the Morro Bay National Estuary Program and
California Department of Parks and Recreation

Front and back cover design by Aaron E. Sims. Front cover photos left to right from top to bottom: California Red-legged Frog (*Rana aurora draytonii*) © California Department of Parks and Recreation, Morro manzanita (*Arctostaphylos morroensis*) © Aaron E. Sims, California Brown Pelican (*Pelecanus occidentalis*) © Aaron E. Sims, Morro 10-lined June Beetle (*Polyphylla* species novae '*morroensis'*) © Lisa Andreano, Southern Sea Otter (*Enhydra lutris nereis*) © U.S. Fish & Wildlife Service, California Horned Lizard (*Phrynosoma coronatum frontale*) © Aaron E. Sims, Morro Bay Kangaroo Rat (*Dipodomys heermanni morroensis*) © U.S. Fish & Wildlife Service, Morro Shoulderband Snail (*Helminthoglypta walkeriana*) © U.S. Fish & Wildlife Service, Popcorn Lichen (*Cladonia firma*) © 2006 *Common Lichens of the Estero Bay Area* by Lisa Andreano, Coastal Rainbow Trout (*Oncorhynchus mykiss irideus*) © U.S. Fish & Wildlife Service, California seablite (*Suaeda californica*) © 2006 *Native Flora of Estero Bay* by Walgren et al., Western Snowy Plover (*Charadrius alexandrinus nivosus*) © California Department of Parks and Recreation.

This reference is dedicated to

Charles E. Sims.

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About the Project

PURPOSE

The object of this project was to compile all available information on the multitude of sensitive natural resources found in the Morro Bay area in order to assist in prioritizing conservation efforts aimed at sensitive species. It provides historical and up-to-date occurrence information for all sensitive species within the Morro Bay area and serves as a comprehensive collection of baseline information for planners, consultants, and the general public alike. This information is imperative on lands already protected as well as those that may become future acquisitions, and is also useful to private landowners that want to prioritize conservation and sustainability.

METHODS

Thorough research was conducted on historical occurrences of sensitive species throughout the area by the use of various references including: California Natural Diversity Database (CNDDB), RarFind 3, and other California Department of Fish and Game (CDFG) records, peer reviewed journals, technical flora and fauna guides and texts, Robert F. Hoover Herbarium and Jepson Consortium of Herbaria, Cal Poly's Aryan Roest Mammal Collection, museums and online databases, California Department of Parks and Recreation (CDPR) technical staff, Caltrans Biologists, and many other professionals throughout San Luis Obispo County. In addition, up-to-date sensitive species occurrence information was gathered by CDPR professional and technical staff through Biological Resource Inventories on state properties, and extensive presence/presence not detected surveys by the author on public open space and selected private parcels. Ground truthing of species occurrence was conducted for out of date historical references, as well as up-to-date references that were vague and/or showed a lack of verifiable sources.

A total of 95 species have been included in this report. These species were selected based on their past and present occurrence within the Morro Bay area and their level of sensitive status. "Sensitive" includes organisms listed as threatened or endangered under the federal Endangered Species Act, threatened or endangered under the California Endangered Species Act, and/or included on one or more of the federal, state, and other status lists discussed in the 'About Sensitive Status' section on page 14 of this reference. Only California Native Plant Society (CNPS) plants listed as 1B or 2 were included for this report, due to the expenditure of time involved with including the numerous CNPS list 4 species that occur in the area and because of their low vulnerability and susceptibility to threat. Some species, such as select lichens and the Morro 10-lined June beetle, were included due to their special endemic status, and/or because there is currently a lack of sufficient documentation on their frequency, distribution, and abundance to determine an adequate sensitive status for the species.

Selected species are grouped into eight taxonomic sections, and include: 5 invertebrate species, 2 fish species, 1 amphibian species, 3 reptile species, 47 bird species, 15 mammal species, 17 plant species, and 5 lichen species. Final drafts of the eight sections were submitted for professional review by experts throughout the area, which specialize in each taxonomic group. When available, professional reviewers provided feedback in the form of written recommendations, revisions, additional references, and expansions of information on individual species accounts and on the taxonomic group as a whole. These improvements were taken into account, and appropriate revisions were made. Michael Walgren reviewed invertebrate, fish, reptile, and amphibian species accounts. Tom Edell reviewed bird species accounts. Francis Villablanca reviewed portions of the mammal species accounts. Lisa Andreano reviewed lichen species accounts. And Michael Walgren and Lisa Andreano reviewed plant species accounts, in addition to an overall review of select portions of the project as a whole.

PROJECT LOCATION

The project location is focused around the Morro Bay Estuary and Morro Bay Watershed along with surrounding areas; including the city of Morro Bay and town of Los Osos and Baywood Park (Fig. 1). The area is located along the central coast of San Luis Obispo County, California, at general latitude of 35º 20' N and longitude of 120º 51' W. The geographical limits of the project location are confined to the area on distribution maps provided in the sensitive species accounts. This area stretches from northern Morro Strand State Beach (south parcel), east to just past Hollister Peak, and south to Hazard Canyon of Montaña de Oro State Park. The map area covers approximately 10,967 hectares (27,100 U.S. acres) of land, with about 1,987 of the hectares (4,910 U.S. acres) attributed to State Park lands.

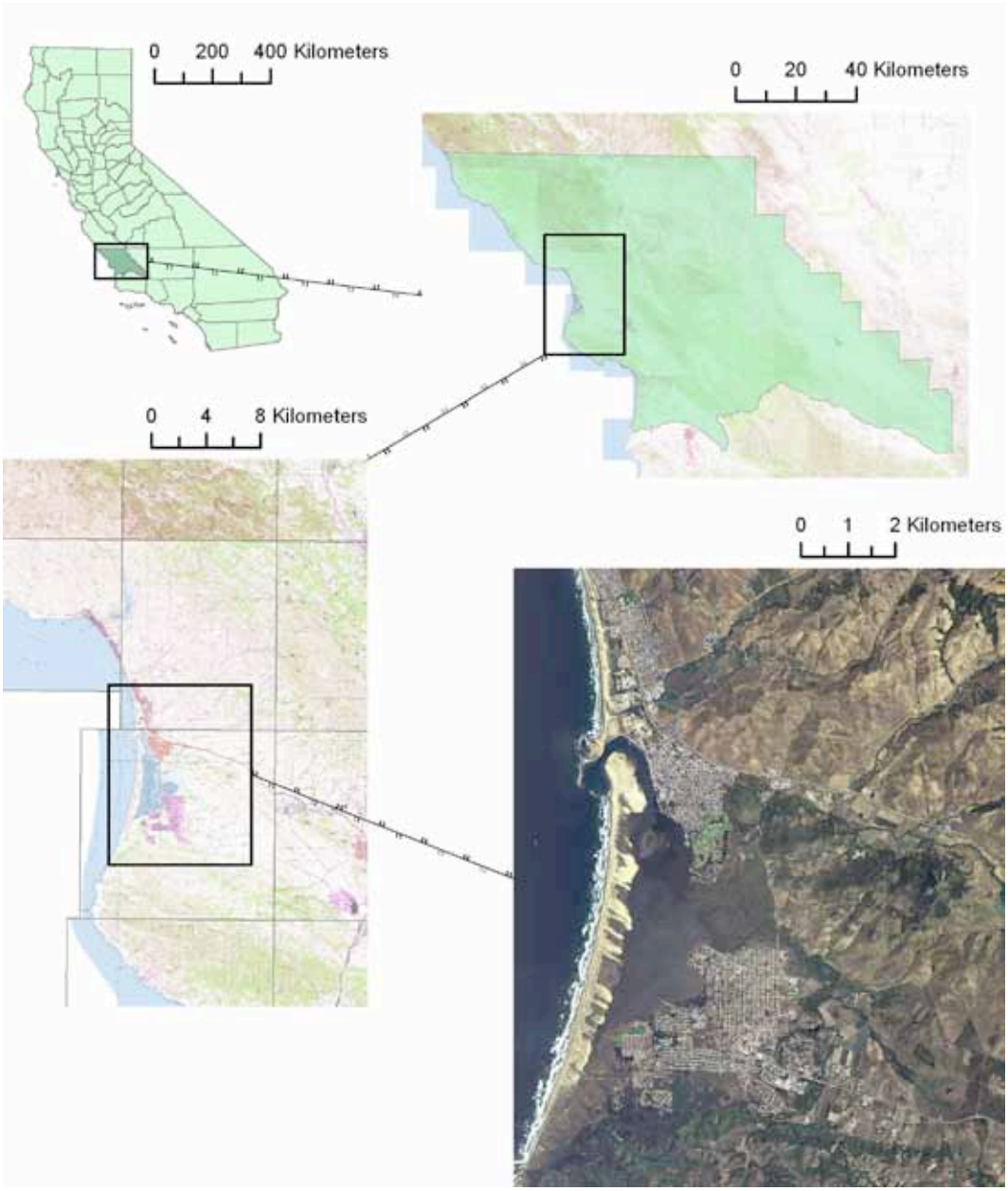

Fig. 1. Diagram of atlas project area, showing location of San Luis Obispo County in California (top left), location of Morro Bay in coastal San Luis Obispo County (top right and bottom left), and aerial image of Morro Bay project area (bottom right). For information about maps used in this diagram please see Base Maps in 'About the Maps' section on page 29.

About Species Accounts

Each species account consists of two pages containing its common name, taxonomic family and scientific name, one to three photos, nine text segments (eight for lichens), a distribution map, and sources used. Photographs were gathered from past CDPR references, select organizations, individuals, and the author, and expressed written consent from each photographer and/or organization was acquired as needed to comply with copyright laws. Photos that do not contain source information are by the author. Any agencies and/or individuals may not use photos that contain "Used With Permission" designations for any purpose without expressed written permission by the particular author provided. Six of the nine text segments (5 of 8 for lichens) contain general information that can be found in various textbooks, guides, and online resources. These include life/growth form (for plant and lichen species accounts), breeding/blooming period, habitat, nesting/reproduction/maternal roosting (for animal species accounts), range, identification, and life history.

Breeding and blooming periods are given as typical intervals in which animal species reproduce and plants bloom. As an average, these periods are not set in stone, and the ranges of dates may vary from year to year based on climate conditions and other factors. Habitat is given as the general environment in which the plant or animal prefers to reside. Species may occur outside of their preferred habitats due to a variety of environmental factors, and are listed in species accounts as an average for general information purposes. General nesting, reproduction, and maternal roosting information are given on animal species accounts to further aid the reader with identification of nests and to provide additional basic information on this topic. Range is given as the general distribution of a species within California and the rest of the world. Identification provides a base of information that characterizes species in addition to the photo(s) provided. Life history provides additional information that is unique to the species, interesting facts and tidbits, and/or additional reproduction and other information.

In addition to the five to six general information segments provided in each species account, there are three text segments that contain dynamic status information. These include sensitive status, status in Morro Bay area, and threats. Sensitive status information is divided into the following three categories: federal, state, and other/CNPS. Information regarding the special status listed within these categories can be found in the 'About Sensitive Status' section on page 14 of this reference. Status in Morro Bay area includes abundance, frequency, and distribution information for the given species within the Morro Bay project area. Abundance designations assigned in the 'Status in Morro Bay area' section are defined on the following page. Threats include past and present known pressures that have limited or may be limiting the frequency, abundance, and distribution of sensitive species. This section includes threats known to affect the species throughout its general range, as well as those that may threaten it within the Morro Bay area if known.

In-text citations have been left out of all sections of the species accounts except for 'Status in Morro Bay area', but are included at the bottom of each distribution map. This was done for two main reasons: to make it easier to read, and to be able to print out or copy individual species accounts and still have all source information available. The 'Status in Morro Bay area' section is cited in-text, as it is the most pertinent specific information in regards to the project area of focus.

TAXONOMY

The taxonomy presented follows that of various texts and standard checklists of North American organisms. The following publications were used for the individual taxonomic groups listed below:

For snail:

Roth, B. and J. Tupen. 2004. Revision of the systematic status of *Helminthoglypta walkeriana morroensis* (Hemphill, 1911) (Gastropoda: Pulmonata). Zootaxa, 616:1-23.

For butterfly:

North American Butterfly Association. 2000-2010. North American Butterflies Occurring North of Mexico. North American Butterfly Association, Inc. Available online at: http://www.naba.org/images/index.html.

For beetles:

Poole, R.W. and P. Gentili (eds.). 1996-1997. Nomina Insecta Nearctica: A checklist of the insects of North America. Entomological Information Services, Rockville, MD. Four volumes. Available online at: http://nearctica.securesites.net/nomina/main.htm.

For fish:

Nelson, J.S., E.J. Crossman, H. Espinosa-Perea, L.T. Findley, C.R. Gilbert, R.N. Lea, and J.D. Williams. 2004. Common and scientific names of fishes from the United States, Canada, and Mexico. American Fisheries Society, Special Publication 29, Bethesda, MD. 386 pp.

For amphibians and reptiles:

Jennings, M.R. 2004. An annotated check list of the amphibians and reptiles of California and adjacent waters (Third, revised edition). California Fish and Game 90(4):161-213.

For birds:

American Ornithologists' Union (AOU). 1998. Check-list of North American birds (seventh edition). American Ornithologists' Union, Washington, D.C. 829 pp. Available online at: http://www.aou.org/checklist/north/index.php.

For mammals:

Wilson, D. E., and D. M. Reeder (eds.). 2005. Mammal Species of the World: A Taxonomic and Geographic Reference (third edition). Johns Hopkins University Press, 2,142 pp.

For plants:

Calflora: Information on California plants for education, research and conservation. Plant name library: name status. [web application]. 2010. Berkeley, California: The Calflora Database [a non-profit organization]. Available online at: http://www.calflora.org.

For lichens:

Tucker, S.C. and B.D. Ryan. 2006. Constancea 84: Revised catalog of lichens, lichenicoles, and allied fungi in California. University and Jepson Herbaria. Available online at: http://ucjeps.berkeley.edu/constancea/84.

ABUNDANCE DESIGNATIONS

The following relative abundance terms are used within the 'Status in Morro Bay area' section of individual species accounts. These terms are not exact and represent the author's view of comparative abundance of particular species, along with the views of reviewers and select references where applicable.

Birds: Abundance designations for birds were taken from those outlined in *The Birds of San Luis Obispo County, California* (Marantz 1986), and are defined as follows:

Common -- Nearly always occurs in appropriate habitats, usually in large to moderate numbers.

Uncommon -- Usually occurs in appropriate habitats, in moderate to small numbers.

Rare -- Expected annually in appropriate habitats, but in very small numbers.

Very Rare -- Expected annually, but usually less than five individuals per year.

Casual -- Two to ten county records.

Accidental -- Only one record for the county.

Plants and Animals: Abundance designations for plants and animals are defined by Dr. David J. Keil, and were taken from materials provided by Dr. Keil's Field Botany course at California Polytechnic State University, San Luis Obispo. They are originally defined for plants, but were also used for animals (except birds) in this report as they may generally apply to many animal species, especially those that have specific habitat requirements. Some animals such as fishes are simply listed as occurring within selected creeks of the Morro Bay area, without specific abundance designations applied. Others may not have an abundance designation given, as there status within the Morro Bay area is unknown or poorly documented. Words contained in parentheses are modifications of the original designations, and are used to more accurately define abundance designations for species included in this report. Plant and animal abundance designations for the Morro Bay area are defined as follows:

Abundant -- Very numerous and widely distributed on the study site.

Locally Abundant -- Abundant over a part of the study site. This usually is combined with a statement defining the portion of the site or specific habitat where the plants (and animals) occur.

Common -- Numerous and widely distributed on the study site. There is no sharp line between abundant and common (however, common is typically used to describe plants and animals that are not as numerous as those defined as abundant).

Locally Common -- Common over a part of the study site. This usually is combined with a statement defining the portion of the site or specific habitat where plants (and animals) occur.

Occasional -- Scattered, but not particularly common. Plants (and animals) may be occasional throughout the area or localized, in which case qualifying wording should be used.

Uncommon -- There aren't many individuals present. A qualifying statement usually accompanies this.

About Sensitive Status

Sensitive status information was gathered for each species using the individual sources below. This was performed in order to obtain the most up-to-date status information available at the time of this publication, as even the most recent compiled lists available contained some outdated status information. The following compiled lists from the California Department of Fish and Game were used as a starting point for sensitive status information and references:

For animals:

> California Department of Fish and Game, Natural Diversity Database. 2009. Special animals. Quarterly publication, July 2009. 59 pp. Available online at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf.
>
> California Department of Fish and Game, Natural Diversity Database. 2010. State and federally listed endangered and threatened animals of California. Quarterly publication, January 2010. 13 pp. Available online at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf.

For plants:

> California Department of Fish and Game, Natural Diversity Database. 2010. Special vascular plants, bryophytes, and lichens list. Quarterly publication, January 2010. 71 pp. Available online at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPPlants.pdf.
>
> California Department of Fish and Game, Natural Diversity Database. 2010. State and federally listed endangered, threatened, and rare plants of California. Quarterly publication, January 2010. 16 pp. Available online at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEPlants.pdf.

FEDERAL

Federal Endangered Species Act (ESA)

The Endangered Species Act of 1973 (ESA) is administered by the Fish and Wildlife Service in the Department of the Interior and the National Oceanic and Atmospheric Administration (NOAA) Fisheries in the Department of Commerce (USFWS 2009).

The Basis for Listing

Under the ESA, the following factors determine whether or not a species should be listed as endangered or threatened:

- The present or threatened destruction, modification, or curtailment of the species' habitat or range;
- Overutilization for commercial, recreational, scientific, or educational purposes;
- Disease or predation;
- The inadequacy of existing regulatory mechanisms; and
- Other natural or manmade factors affecting the species' continued existence.

(Nicholopoulos 1999)

The official listing of Endangered and Threatened species is published in the Code of Federal Regulations under Title 50, Section 17.11 for animals, and Title 50, Section 17.12 for plants. Plants and animals listed as Threatened or Endangered in the ESA of the Federal Register can be found online at: http://www.epa.gov/fedrgstr/EPA-SPECIES/index.html.

Marine Mammal Commission - Species of Special Concern

> Section 202 of the Marine Mammal Protection Act directs the Marine Mammal Commission, in consultation with its Committee of Scientific Advisors, to make recommendations to the Department of Commerce, the Department of the Interior, and other federal agencies on research and management actions needed to conserve species of marine mammals.
>
> To meet this charge, the Commission devotes special attention to particular species and populations that are vulnerable to various types of human-related activities, impacts, and contaminants. Such species may include marine mammals listed as endangered or threatened under the Endangered Species Act or as depleted under the Marine Mammal Protection Act. In addition, the Commission often directs special attention to other species or populations of marine mammals not so listed whenever special conservation challenges arise that may affect them. (Marine Mammal Commission 2009)

More information about the Marine Mammal Commission and the Species of Special Concern list is available online at: http://www.mmc.gov/species.

Marine Mammal Protection Act (MMPA)

The Marine Mammal Commission and NOAA Fisheries Service administer the MMPA. Outlines of the MMPA and the official document itself are available online at: http://www.nmfs.noaa.gov/pr/laws/mmpa.

> The Marine Mammal Protection Act (MMPA) was enacted on October 21, 1972. All marine mammals are protected under the MMPA. The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S.
>
> Congress passed the Marine Mammal Protection Act of 1972 based on the following findings and policies:
>
> • Some marine mammal species or stocks may be in danger of extinction or depletion as a result of human activities;
>
> • These species or stocks must not be permitted to fall below their optimum sustainable population level ("depleted");
>
> • Measures should be taken to replenish these species or stocks;
>
> • There is inadequate knowledge of the ecology and population dynamics; and
>
> • Marine mammals have proven to be resources of great international significance.
>
> The MMPA was amended substantially in 1994 to provide for:
>
> • Certain exceptions to the take prohibitions, such as for Alaska Native subsistence and permits and authorizations for scientific research;
>
> • A program to authorize and control the taking of marine mammals incidental to commercial fishing operations;
>
> • Preparation of stock assessments for all marine mammal stocks in waters under U.S. jurisdiction; and
>
> • Studies of pinniped-fishery interactions.
>
> (NOAA undated)

Migratory Bird Treaty Act (MBTA)

The Migratory Bird Treaty Act (MBTA) of 1918 implemented the 1916 convention between the United States and Great Britain for the protection of birds migrating between the U.S. and Canada. Similar conventions between the United States and Mexico (1936), Japan (1972) and the Union of Soviet Socialists Republics (1976) further expanded the scope of international protection of migratory birds. Each new treaty has been incorporated into the MBTA as an amendment and the provisions of the new treaty are implemented domestically. These four treaties and their enabling legislation, the MBTA, established Federal responsibilities for the protection of nearly all species of birds, their eggs and nests.

The MBTA made it illegal for people to "take" migratory birds, their eggs, feathers or nests. Take is defined in the MBTA to include by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing or transporting any migratory bird, nest, egg, or part thereof. The Bald and Golden Eagle Protection Act affords additional protection to all bald and golden eagles.

Migratory Birds and Habitat Programs primarily operates under the auspices of the MBTA. In total, 836 bird species are protected by the MBTA, 58 of which are currently legally hunted as game birds. A migratory bird is any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle. (USFWS undated)

The official listing of birds protected under the MBTA is published in the Code of Federal Regulations under Title 50, Section 10.13. An adaptation of the List of Migratory Birds that appears in the Federal Register is available online at: http://www.fws.gov/migratorybirds/RegulationsPolicies/mbta/mbtandx.html.

Partners in Flight WatchList

The *Partners in Flight* WatchList was introduced in 1996 to draw attention to those species of migratory birds in the United States that are most in need of conservation action. The WatchList does not include federally threatened or endangered species. Rather, it identifies those species that are still fairly common, but that—without proper attention—will probably someday occupy an unenviable place on the endangered species list. The species on the 1998-1999 WatchList are those that have declined precipitously over the past several decades, occupy habitats that are under severe threat, are found in low numbers, or have such narrowly restricted ranges that their existence is tenuous. (USFWS 1999)

The Partners in Flight (PIF) general WatchList from 1998 to 1999 is available online at: library.fws.gov/Pubs/mbd_watchlist.pdf. In addition, a more detailed PIF WatchList can be found in the "Partners in Flight North American Landbird Conservation Plan" (2004). This publication, along with more information on PIF and the PIF WatchList is available online at: http://www.partnersinflight.org.

USDA Forest Service - Sensitive Species

USDA Forest Service defines sensitive species as those plant and animal species identified by a regional forester that are not listed or proposed for listing under the federal Endangered Species Act for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. Regional Foresters shall identify sensitive species occurring within the region. California is the Pacific Southwest Region (Region 5). (CDFG, CNDDB 2009)

An update to the plant sensitive species list was completed in 2006, and the Pacific Southwest Region is in the process of updating the list for animals. The sensitive plant list is available online at: www.fs.fed.us/r5/tahoe/documents/veg/06_sept_22_sensitive_plants.pdf. And more information about USDA Forest Service sensitive species is available online at: http://www.fs.fed.us/r5/projects/sensitive-species.

U.S. Fish & Wildlife Service - Birds of Conservation Concern

The United States Fish and Wildlife Service's Division of Migratory Bird Management creates a publication entitled Birds of Conservation Conserve to prioritize efforts in conservation of migratory and non-migratory birds.

> This publication identifies species, subspecies, and populations of migratory and nonmigratory birds in need of additional conservation actions. We hope to stimulate coordinated and collaborative proactive conservation actions among Federal, State, tribal, and private partners. The species that appear in Birds of Conservation Concern 2008 are deemed to be the highest priority for conservation actions. We anticipate that the document will be consulted by Federal agencies and their partners prior to undertaking cooperative research, monitoring, and management actions that might directly or indirectly affect migratory birds. (USFWS 2010)

The Birds of Conservation Concern publication can be found online at: http://www.fws.gov/migratorybirds.

U.S. Fish & Wildlife Service - Species of Concern

Species of Concern is an informal term that is not defined in the Endangered Species Act. The term refers to species that are declining or appear to be in need of conservation. The Sacramento Fish and Wildlife Office no longer maintains a Federal Species of Concern list, however Fish and Wildlife Office of Oregon still does. Animals appearing on the Oregon Species of Concern list were noted in this reference to be as comprehensive as possible. The Oregon Species of Concern list is available online at: http://www.fws.gov/oregonfwo/Species/Lists/Documents/OregonStateSpeciesList.PDF.

STATE

California Endangered Species Act (CESA)

The following is a summary of general information about the CESA provided by the California Environmental Resources Evaluation System (CERES):

- The California Endangered Species Act (CESA) (Fish & Game Code §§2050, *et seq.*) generally parallels the main provisions of the Federal Endangered Species Act and is administered by the California Department of Fish and Game (DFG).
- Under CESA the term "endangered species" is defined as a species of plant, fish, or wildlife which is "in serious danger of becoming extinct throughout all, or a significant portion of its range" and is limited to species or subspecies native to California.
- CESA establishes a petitioning process for the listing of threatened or endangered species. The California Fish and Game Commission is required to adopt regulations for this process and establish criteria for determining whether a species is endangered or threatened. The California Code of Regulations, tit. 14 §670.1(a) sets forth the required contents for such a petition.
- CESA prohibits the "taking" of listed species except as otherwise provided in State law. Unlike its Federal counterpart, CESA applies the take prohibitions to species petitioned for listing (state candidates).

- §86 of the Fish and Game Code defines "take" as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

(California Resources Agency 2005)

The official listing of California Endangered and Threatened animals is contained in the California Code of Regulations, Title 14, Section 670.5, and in Title 14, Section 670.2 for Endangered and Threatened plants. More information about CESA is available online at: http://www.dfg.ca.gov/habcon.

California Department of Forestry & Fire Protection - Sensitive Species

The Board of Forestry classifies "sensitive species" as those species that warrant special protection during timber operations. The list of "sensitive species" is given in §895.1 (Definitions) of the California Forest Practice Rules. The 2009 Forest Practice Rules are available at: http://www.fire.ca.gov/resource_mgt/downloads/2009_Forest_Practice_Rules_and_Act.pdf.

(CDFG, CNDDB 2009)

California Department of Fish & Game - Species of Special Concern and Taxa to Watch

It is the goal and responsibility of the Department of Fish and Game to maintain viable populations of all native species. To this end, the Department has designated certain vertebrate species as "Species of Special Concern" because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. The goal of designating species as "Species of Special Concern" is to halt or reverse their decline by calling attention to their plight and addressing the issues of concern early enough to secure their long term viability. Not all "Species of Special Concern" have declined equally; some species may be just starting to decline, while others may have already reached the point where they meet the criteria for listing as a "Threatened" or "Endangered" species under the State and/or Federal Endangered Species Acts. More information is available on the Department's web site at: http://www.dfg.ca.gov/wildlife/species/ssc/index.html. The reports for fish and amphibians and reptiles are available on-line.

Fish: http://www.dfg.ca.gov/habcon/info/fish_ssc.pdf.

Amphibians & Reptiles: http://www.dfg.ca.gov/habcon/info/herp_ssc.pdf.

A new California Bird Species of Special Concern report was completed in 2008. More information is available at: http://www.dfg.ca.gov/wildlife/species/ssc/birds.html. A new category of "Taxa to Watch" was created in the new California Bird Species of Special Concern report. The birds on this watch list are 1) not on the current Special Concern list but were on previous lists and they have not been state listed under CESA; 2) were previously state or federally listed and now are on neither list; or 3) are on the list of "fully protected" species. More information and brief accounts for each species is available in the report.

Information on Mammal Species of Special Concern is available at: http://www.dfg.ca.gov/wildlife/species/ssc/mammals.html.

(CDFG, CNDDB 2009)

California Department of Fish & Game - Fully Protected Animals

The classification of Fully Protected was the State's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, amphibians and reptiles, birds and mammals. Most of the species on these

lists have subsequently been listed under the state and/or federal endangered species acts

The Fish and Game Code sections dealing with Fully Protected species state that these species ".... may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected" species, although take may be authorized for necessary scientific research. This language arguably makes the "Fully Protected" designation the strongest and most restrictive regarding the "take" of these species. In 2003 the code sections dealing with fully protected species were amended to allow the Department to authorize take resulting from recovery activities for state-listed species.

More information on Fully Protected species and the take provisions can be found in the Fish and Game Code, (birds at §3511, mammals at §4700, reptiles and amphibians at §5050, and fish at §5515). Additional information on Fully Protected fish can be found in the California Code of Regulations, Title 14, Division 1, Subdivision 1, Chapter 2, Article 4, §5.93. The category of Protected Amphibians and Reptiles in Title 14 has been repealed.

(CDFG, CNDDB 2009)

The Fish and Game list of Fully Protected Animals is available online at: http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/fully_pro.html.

California Department of Fish & Game - Endemic Special Status Vertebrates/Invertebrates

The Department of Fish and Game lists Endemic Special Status Invertebrates and Endemic Special Status Vertebrates in a publication entitled *California Wildlife: Conservation Challenges*. A synopsis of the publication follows:

In 2000, Congress enacted the State Wildlife Grants Program to support state programs that broadly benefit wildlife and habitats but particularly "species of greatest conservation need." As a requirement for receiving funding under this program, state wildlife agencies were to have submitted a Wildlife Action Plan (comprehensive wildlife conservation strategy) to the U.S. Fish and Wildlife Service in 2005. The California Department of Fish and Game (Fish and Game), working in partnership with the Wildlife Health Center, University of California, Davis, directed the development of this report, *California Wildlife: Conservation Challenges*, the state's Wildlife Action Plan, and associated Web publications.

California Wildlife: Conservation Challenges is directed at answering three primary questions:

- What are the species and habitats of greatest conservation need?
- What are the major stressors affecting California's native wildlife and habitats?
- What are the actions needed to restore and conserve California's wildlife, thereby reducing the likelihood that more species will approach the condition of threatened or endangered?

(Bunn et al. 2007, xix)

California Wildlife: Conservation Challenges is available online at: http://www.dfg.ca.gov/wildlife/wap/report.html.

California Heritage (CNDDB) Element Ranking For Animals

The CNDDB ranking codes are part of the "Heritage Methodology". It is a shorthand formula that provides information about the status of a taxon, both throughout its entire range and within California. We use the best information available to assign these ranks and they are changed and refined as new information becomes available. More detailed

information about the conservation status ranking system can be found at: http://www.natureserve.org/explorer/ranking.htm.

(CDFG, CNDDB 2009)

California Heritage (CNDDB) Element Ranking For Plants

All Heritage Programs, such as the California Natural Diversity Database (CNDDB) use the same ranking methodology, originally developed by The Nature Conservancy and now maintained by Natureserve. It includes a **Global rank** (G rank), describing the rank for a given taxon over its entire distribution and a **State rank** (S rank), describing the rank for the taxon over its state distribution. For subspecies and varieties, there is also a "T" rank describing the global rank for the subspecies. The second page of this document details the criteria used to assign element ranks, from G1 to G5 for the Global rank and from S1 to S5 for the State rank. Procedurally, state programs such as the CNDDB develop Global ranks and State ranks and the Global ranks are checked for consistency and logical errors by Natureserve at the national level. All CNDDB plant ranks are reviewed and approved by the Rare Plant Status Review Committee.

The first step to ranking is based on *rarity*, and involves counting total occurrences, counting the number of "good" (highly ranked) occurrences and counting individuals for a given plant. An occurrence for a plant is defined as any population or group of nearby populations located more than 0.25 miles from any other population. If sufficient information is available, element occurrences can be ranked A-D, depending on apparent degree of viability and habitat condition. Usually the two biggest factors are population size and habitat quality. However, there is more to ranking than just counting element occurrences and individuals. Some of the other considerations specific to plants or lichens include:

- An aerial view of the extent of the distribution. Is the taxon very narrowly distributed (even if it has lots of occurrences), or is it scattered over a wide area?
- Are the element occurrences very large, very small, or mixed in size? Are small occurrences viable over time?
- What is the total acreage of the element occurrences?
- Is the element located in a vulnerable habitat type, such as in wetlands?
- What aspects of the biology and ecology of the element should we consider when ranking it? Some aspects to consider are life form, life span, reproductive strategy, demographic concerns, persistence of seed bank, reaction to disturbance, dependence on pollinators or seed dispersal agents, restriction to soil type and other "niche breadth" concerns, and more.
- Is anything known about trends for the element? What are the threats and how severe and imminent are they? Do we think the species is increasing, decreasing or stable? With the above considerations in mind, refer to the next page for the numerical definitions for G1-5 and S1-5. A taxon's ranking status may be adjusted up or down depending upon the considerations above.

ELEMENT RANKING

GLOBAL RANKING

The *global rank* (G-rank) is a reflection of the overall condition of an element throughout its global range. **Both Global and State ranks represent a letter+number score that reflects a combination of Rarity, Threat and Trend factors, with weighting being heavier on Rarity than the other two.**

SPECIES OR NATURAL COMMUNITY LEVEL

G1 = **Critically Imperiled**—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

G2 = **Imperiled**—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

G3 = **Vulnerable**—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

G4 = **Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

G5 = **Secure**—Common; widespread and abundant.

SUBSPECIES LEVEL

Subspecies receive a **T-rank** attached to the G-rank. With the subspecies, the G-rank reflects the condition of the entire species, whereas the T-rank reflects the global situation of just the subspecies or variety. For example: *Chorizanthe robusta* var. *hartwegii*. This plant is ranked G2T1. The G-rank refers to the whole species range i.e., *Chorizanthe robusta.* The T-rank refers only to the global condition of var. *hartwegii*.

STATE RANKING

The *state rank* (S-rank) is assigned much the same way as the global rank, but state ranks refer to the endangerment status only within California's state boundaries.

S1 = **Critically Imperiled**—Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

S2 = **Imperiled**—Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.

S3 = **Vulnerable**—Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 = **Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 = **Secure**—Common, widespread, and abundant in the state.

(CDFG, CNDDB 2009)

More detailed information about the conservation status ranking system is available online at: http://www.natureserve.org/explorer/ranking.htm.

OTHER STATUS

American Bird Conservancy - United States WatchList of Birds of Conservation Concern

The United States *WatchList*, a joint project between American Bird Conservancy and the National Audubon Society, reflects a comprehensive analysis of all the bird species in the United States. It reveals those in greatest need of immediate conservation attention to survive a convergence of environmental challenges, including habitat loss, invasive species, and global warming. The list builds on the species assessments conducted for many years by Partners in Flight (PIF) on landbirds, using those same PIF standards, but expanded to

cover species of all taxa. The list is based on the latest available research and assessments from the bird conservation community, along with data from the Christmas Bird Count and Breeding Bird Survey. (American Bird Conservancy 2007)

The American Bird Conservancy WatchList is available at: http://www.abcbirds.org/abcprograms/science/watchlist.

American Fisheries Society - Conservation Status of Imperiled North American Freshwater and Diadromous Fishes

Designations for freshwater and diadromous species were taken from:

Jelks, H.L., S.J. Walsh, N.M. Burkhead, S. Contreras-Balderas, E. Díaz-Pardo, D.A. Hendrickson, J. Lyons, N.E. Mandrak, F. McCormick, J.S. Nelson, S.P. Platania, B.A. Porter, C.B. Renaud, J. J. Schmitter-Soto, E.B. Taylor, and M.L. Warren, Jr. 2008. Conservation status of imperiled North American freshwater and diadromous fishes. Fisheries 33(8):372-407.

This reference is available online at: http://www.fisheries.org/afs/docs/fisheries/fisheries_3308.pdf.

Bureau of Land Management (BLM) - Sensitive Species

BLM Manual §6840 defines sensitive species as"…those species that are (1) under status review by the FWS/NMFS; or (2) whose numbers are declining so rapidly that Federal listing may become necessary, or (3) with typically small and widely dispersed populations; or (4) those inhabiting ecological refugia or other specialized or unique habitats." Existing California-BLM policy concerning the designation of sensitive species identifies two conditions that must be met before a species may be considered as BLM sensitive: (1) a significant population of the species must occur on BLM-administered lands, and (2) the potential must exist for improvement of the species' condition through BLM management. The "Sensitive Species" designation is not meant to include federally listed species, proposed species, candidate species or State-listed species. It is BLM policy to provide sensitive species with the same level of protection that is given federal candidate species. (CDFG, CNDDB 2009)

The BLM sensitive species lists are available online at: http://www.blm.gov/ca/pdfs/pa_pdfs/biology_pdfs/SensitiveAnimals.pdf for animals, and at: www.blm.gov/ca/pdfs/pa_pdfs/biology_pdfs/SensitivePlants.pdf for plants.

California Lichen Society (CALS) List of Lichens of Concern

The CALS aims to promote the conservation, appreciation, and study of lichens. The society focuses on California, but is also interested in lichens across the entire western part of the North American continent (CALS undated).

The California Lichen Society (CALS) provides information on the conservation concern for lichens in two formats. One is a series of lists that use the same criteria as those of the California Native Plant Society (CNPS; http://www.cnps.org/cnps/rareplants/ranking.php). The other is rankings that are very similar to those used by the California Natural Diversity Database (CNDDB; http://www.dfg.ca.gov/biogeodata/) and NatureServe (http://www. natureserve.org). The primary difference in the CALS listing and ranking is that we cover additional states, as no similar organization exists in other southwestern states to provide lichen conservation information.

(CALS 2009)

More information about the CALS is available online at: http://californialichens.org. The CALS List of Lichens of Concern is available online at: calscc.crustose.net/CALSLichensOfConcern_2009-03.pdf.

California Native Plant Society (CNPS) Rare Plant Program and Lists

The CNPS Rare Plant Program

The mission of the CNPS Rare Plant Program (The Program) is to develop current, accurate information on the distribution, ecology, and conservation status of California's rare and endangered plants, and to use this information to promote science-based plant conservation in California.

The Program, since its inception in 1968, has developed a reputation for scientific accuracy and integrity. The Program's data are widely accepted as the standard for information on the rarity and endangerment status of the California flora. For this reason, The Program's primary responsibility is the maintenance of the CNPS Inventory of Rare and Endangered Plants of California (the CNPS Inventory), which tracks the conservation status of hundreds of plant species.

(CNPS 1999-2010b)

The CNPS Ranking System - CNPS Lists

CNPS has created five "lists" in an effort to categorize degrees of concern. Please see the Online Inventory for information about the number of plant taxa in each category and for more information about the species tracked as rare by CNPS. The CNPS lists are described as follows:

List 1A: Plants Presumed Extinct in California

The plants of List 1A (less than 30 taxa) are presumed extinct because they have not been seen or collected in the wild in California for many years. This list includes plants that are both presumed extinct in California, as well as those plants which are presumed extirpated in California. A plant is extinct in California if it no longer occurs in or outside of California. A plant that is extirpated from California has been eliminated from California, but may still occur elsewhere in its range.

List 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere

The plants of List 1B are rare throughout their range with the majority of them endemic to California. Most of the plants of List 1B have declined significantly over the last century. List 1B plants constitute the majority of the plants in CNPS' Inventory with more than 1,000 plants assigned to this category of rarity.

List 2: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere

Except for being common beyond the boundaries of California, the plants of List 2 would have appeared on List 1B. From the federal perspective, plants common in other states or countries are not eligible for consideration under the provisions of the Endangered Species Act. Until 1979, a similar policy was followed in California. However, after the passage of the Native Plant Protection Act, plants were considered for protection without regard to their distribution outside the state.

List 3: Plants About Which We Need More Information - A Review List

The plants that comprise List 3 are united by one common theme - we lack the necessary information to assign them to one of the other lists or to reject them. Nearly all of the plants remaining on List 3 are taxonomically problematic.

List 4: Plants of Limited Distribution - A Watch List

The plants in this category are of limited distribution or infrequent throughout a broader area in California, and their vulnerability or susceptibility to threat appears relatively low at this time. While we cannot call these plants "rare" from a statewide perspective, they are uncommon enough that their status should be monitored regularly. Should the degree of endangerment or rarity of a List 4 plant change, we will transfer it to a more appropriate list.

Threat Ranks

The CNPS Threat Rank is an extension added onto the CNPS List and designates the level of endangerment by a 1 to 3 ranking, with 1 being the most endangered and 3 being the least endangered. A Threat Rank is present for all List 1B's, List 2's and the majority of List 3's and List 4's. List 4's may contain a Threat Rank of 0.2 or 0.3; however an instance in which a Threat Rank of 0.1 is assigned to a List 4 plant has not yet been encountered. List 4 plants generally have large enough populations to not have significant threats to their continued existence in California; however, certain conditions still exist to make the plant a species of concern and hence be placed on a CNPS List. In addition, all List 1A (presumed extinct in California), and some List 3 (need more information) and List 4 (limited distribution) plants, which lack threat information, do not have a Threat Rank extension.

Threat Rank extensions and their meanings

0.1 = Seriously threatened in California (high degree/immediacy of threat).

0.2 = Fairly threatened in California (moderate degree/immediacy of threat).

0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known).

(CNPS 1999-2010a)

There are many CNPS List 4 plant species that occur in the Morro Bay area, however these species were not recognized in this reference due to their low vulnerability or susceptibility to threat. List 1A and List 3 species are not known to occur within the Morro Bay project area. All CNPS lists are described here regardless of their inclusion in the project for information purposes. More information about the CNPS Rare Plant Program and Ranking System is available online at: http://www.cnps.org/cnps/rareplants.

CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

Widespread information nowadays about the endangered status of many prominent species, such as the tiger and elephants, might make the need for such a convention seem obvious. But at the time when the ideas for CITES were first formed, in the 1960s, international discussion of the regulation of wildlife trade for conservation purposes was something relatively new. With hindsight, the need for CITES is clear. Annually, international wildlife trade is estimated to be worth billions of dollars and to include hundreds of millions of plant and animal specimens. The trade is diverse, ranging from live

animals and plants to a vast array of wildlife products derived from them, including food products, exotic leather goods, wooden musical instruments, timber, tourist curios and medicines. Levels of exploitation of some animal and plant species are high and the trade in them, together with other factors, such as habitat loss, is capable of heavily depleting their populations and even bringing some species close to extinction. Many wildlife species in trade are not endangered, but the existence of an agreement to ensure the sustainability of the trade is important in order to safeguard these resources for the future.

(CITES undated - b)

The CITES Appendices

Appendices I, II and III to the Convention are lists of species afforded different levels or types of protection from over-exploitation.

Appendix I lists species that are the most endangered among CITES-listed animals and plants. They are threatened with extinction and CITES prohibits international trade in specimens of these species except when the purpose of the import is not commercial, for instance for scientific research. In these exceptional cases, trade may take place provided it is authorized by the granting of both an import permit and an export permit (or re-export certificate).

Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. It also includes so-called "look-alike species", i.e. species of which the specimens in trade look like those of species listed for conservation reasons. International trade in specimens of Appendix-II species may be authorized by the granting of an export permit or re-export certificate. No import permit is necessary for these species under CITES (although a permit is needed in some countries that have taken stricter measures than CITES requires). Permits or certificates should only be granted if the relevant authorities are satisfied that certain conditions are met, above all that trade will not be detrimental to the survival of the species in the wild.

Appendix III is a list of species included at the request of a Party that already regulates trade in the species and that needs the cooperation of other countries to prevent unsustainable or illegal exploitation. International trade in specimens of species listed in this Appendix is allowed only on presentation of the appropriate permits or certificates.

(CITES undated - a)

More information about the CITES Appendices, along with a list of species included in CITES Appendices I, II and III are available online at: http://www.cites.org/eng/app/index.shtml.

Essig Museum of Entomology - Proposed for Listing Under Endangered Species Act

The Essig Museum of Entomology is a world-class terrestrial arthropod collection with a historical focus on surveying the insect fauna of California. Today that focus has broadened to include the eastern Pacific Rim and the islands of the Pacific Basin. The Essig Museum is part of a consortium of museums on the UC Berkeley campus.

Proposed Species

Numerous insects and other arthropods have been proposed for listing under the Endangered Species Act but which have not yet been formally declared as protected by law. The list is long and growing. And many thousands of species have yet to be studied at a level of detail to allow any assessment of status to be made. Many insects on these lists may already be extinct.

(Essig Museum of Entomology, undated)

More information about the Essig Museum of Entomology is available online at: http://essig.berkeley.edu. The catalog of insects and arthropods proposed for listing by the Essig Museum is available online at: http://essig.berkeley.edu/endins/proposed.htm.

IUCN (International Union for Conservation of Nature) - The IUCN Red List of Threatened Species

> The IUCN Species Programme working with the IUCN Species Survival Commission (SSC) has for more than four decades been assessing the conservation status of species, subspecies, varieties, and even selected subpopulations on a global scale in order to highlight taxa threatened with extinction, and therefore promote their conservation. Although today we are operating in a very different political, economic, social and ecological world from that when the first IUCN Red Data Book was produced, the IUCN Species Programme, working with the Species Survival Commission and many partners, remains firmly committed to providing the world with the most objective, scientifically-based information on the current status of globally threatened biodiversity. The plants and animals assessed for the IUCN Red List are the bearers of genetic diversity and the building blocks of ecosystems, and information on their conservation status and distribution provides the foundation for making informed decisions about conserving biodiversity from local to global levels.
>
> The IUCN Red List of Threatened Species™ provides taxonomic, conservation status and distribution information on plants and animals that have been globally evaluated using the IUCN Red List Categories and Criteria [http://www.iucnredlist.org/technical-documents/categories-and-criteria]. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those plants and animals that are facing a higher risk of global extinction (i.e. those listed as **Critically Endangered**, **Endangered** and **Vulnerable**). The IUCN Red List also includes information on plants and animals that are categorized as **Extinct** or **Extinct in the Wild**; on taxa that cannot be evaluated because of insufficient information (i.e., are **Data Deficient**); and on plants and animals that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation programme (i.e., are **Near Threatened**). Plants and animals that have been evaluated to have a low risk of extinction are classified as **Least Concern**. (IUCN 2008)

More information about the IUCN Species Programme is available online at: http://cms.iucn.org /about/work/programmes/species/index.cfm. Additional information about the IUCN Species Survival Commission (SSC) is available online at: http://cms.iucn.org/about/work/programmes/species/about_ ssc/index.cfm.

National Audubon Society - The 2007 Audubon WatchList

> Audubon and the America Bird Conservancy have joined forces to rally conservationists around America's most imperiled birds. WatchList 2007, a new analysis from these leading bird conservation organizations, uses the latest available research from the bird conservation community along with citizen science data from the Christmas Bird Count [http://www.audubon.org/bird/cbc/index.html] and the annual Breeding Bird Survey to identify 176 species in the continental U.S. and 38 in Hawaii that are in need of immediate conservation help. It is a call to action to save species fighting for survival amid a convergence of environmental challenges, including habitat loss, invasive species and global warming.
>
> RED: species in this category are declining rapidly and/or have very small populations or limited ranges, and face major conservation threats. These typically are species of global conservation concern.

YELLOW: this category includes species that are either declining or rare. These typically are species of national conservation concern.

(National Audubon Society 2010)

More information about the 2007 Audubon WatchList is available online at: http://web1.audubon.org/science/species/watchlist.

Western Bat Working Group - Regional Bat Species Priority Matrix

The Western Bat Working Group (WBWG) is a partner in the Coalition of North American Bat Working Groups, and is comprised of organizations, agencies, and individuals interested in bat management, research, and conservation from Provinces of British Columbia and Alberta, Northern Mexico, and 13 western States (WBWG 2005-2010).

Regional Bat Species Priority Matrix

The Western Bat Species: Regional Priority Matrix is a product of the Western Bat Working Group Workshop held in Reno, Nevada, February 9-13, 1998. The matrix is intended to provide states, provinces, federal land management agencies, and interested organizations and individuals a better understanding of the overall status of a given bat species throughout its western North American range. Subsequently, the importance of a single region or multiple regions to the viability and conservation of each species becomes more apparent. The matrix should also provide a means to prioritize and focus population monitoring, research, conservation actions, and the efficient use of limited funding and resources currently devoted to bats.

The following descriptors provide the information needed to interpret the Western Bat Species: Regional Priority Matrix.

RED OR HIGH: Based on available information on distribution, status, ecology, and known threats, this designation should result in these species being considered the highest priority for funding, planning, and conservation actions. Information about status and threats to most species could result in effective conservation actions being implemented should a commitment to management exist. These species are imperiled or are at high risk of imperilment.

YELLOW OR MEDIUM: This designation indicates a level of concern that should warrant closer evaluation, more research, and conservation actions of both the species and possible threats. A lack of meaningful information is a major obstacle in adequately assessing these species' status and should be considered a threat.

GREEN OR LOW: This designation indicates that most of the existing data support stable populations of the species, and that the potential for major changes in status in the near future is considered unlikely. While there may be localized concerns, the overall status of the species is believed to be secure. Conservation actions would still apply for these bats, but limited resources are best used on red and yellow species.

(WBWG 2007)

More information about the WBWG is available online at: http://www.wbwg.org. The WBWG Regional Bat Species Priority Matrix is available online at: www.wbwg.org/speciesinfo/species_matrix/spp_matrix.pdf.

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About the Maps

All maps in this document were created using ESRI ArcGIS Desktop 9.2. Maps are included as general visual aids to accompany the text, and also for planning and study purposes. That being said, State Park boundaries, major roads, creeks, selected habitats, soils, and plant and animal distributions are approximations only, and should be noted as such when referencing this document.

PROJECTION

All base maps, legend items, and plant and animal distribution points and polygons are projected as Universal Transverse Mercator (UTM) System Projection, Zone 10, North American Datum (NAD) 1983:

> The UTM coordinate system is a grid-based method of specifying locations on the earth's surface. The globe is divided into 60 zones for the UTM system. Each zone spans six degrees of longitude and has its own central meridian from which it spans 3 degrees west and 3 degrees east.
>
> The North American Datum of 1983 is based on earth and satellite observations using the GRS 80 spheroid. The origin of the datum is the earth's center of mass, and it has no initial point or initial direction. (ESRI undated)

For more information about map projections please visit the National Geospatial-Intelligence Agency (NGA) online at: http://earth-info.nga.mil/GandG/publications/tm8358.1/toc.html.

SCALE

The scale of all distribution maps is set to 1:75,000. This scale was determined by including all areas outlined in the project proposal, then focusing in on these areas as closely as possible while still allowing maps to fit on a standard 8.5x11 inch page. If distribution maps are printed on a full 8.5x11 inch page without being resized, as with the hard copy of this document, 1 centimeter equals 750 meters (1 inch equals 6,250 feet).

LEGEND

The general legend is located in the top right corner of each map. It was placed in this location due to limited availability of space, and because this northeast corner of the map is outside of the area of focus for this project. The general legend consists of four items: 'Major Roads', 'Creeks', 'State Parks', and a kilometer scale bar.

The 'Major Roads' and 'Creeks' layers were created by locating and digitizing roads and creeks from National Agricultural Imagery Program (NAIP) 2005 aerial imagery and United States Geological Survey (USGS) Digital Raster Graphics (DRG) maps. In addition, the 'Creeks' layer was created in part with the aid of a coastal creeks layer created by San Luis Obispo County (1998), which can be found on Cal Poly's SLO Datafinder located online at: http://lib.calpoly.edu/collections/gis/slodatafinder.

The 'State Parks' layer is derived from California State Parks Acquisition and Development Division. State Park boundaries are approximate and should not be considered legal descriptions, and are intended for study purposes only.

BASE MAPS

Base maps are maps on which main data can be plotted, and in this case are simply either an aerial map, topographic map, or an outline of coastal San Luis Obispo County focused on the area of

study. The base map of plant and animal distribution maps was created in part by using an outline of San Luis Obispo County from GIS data created by the California Air Resources Board, 2004. The aerial base map used for some maps is 2005 aerial imagery of San Luis Obispo County provided by the National Agriculture Imagery Program (NAIP):

> The National Agriculture Imagery Program (NAIP) acquires aerial imagery during the agricultural growing seasons in the continental U.S. A primary goal of the NAIP program is to make digital ortho photography available to governmental agencies and the public within a year of acquisition.
>
> NAIP is administered by the USDA's Farm Service Agency (FSA) through the Aerial Photography Field Office in Salt Lake City. This "leaf-on" imagery is used as a base layer for GIS programs in FSA's County Service Centers, and is used to maintain the Common Land Unit (CLU) boundaries. (USDA Farm Service Agency 2009)

Topographic base maps used are Morro Bay topo quads from the U.S. Geological Survey (USGS) 7.5-minute Digital Raster Graphics (DRG):

> A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey (USGS) standard series topographic map, including all map collar information. The image inside the map neatline is georeferenced to the surface of the earth and fit to the Universal Transverse Mercator projection. The horizontal positional accuracy and datum of the DRG matches the accuracy and datum of the source map. The map is scanned at a minimum resolution of 250 dots per inch. (USGS 2008)

Both NAIP aerial imagery and USGS DRG base maps were also used as an aid to create the 'Major Roads', 'Creeks', and 'Selected Habitats' layers and can be found in the California Spatial Information Library (CaSIL) available online at: http://www.atlas.ca.gov.

DATABASES

The following two databases contained geo-referenced data used to map distributions of selected plants and animals: the California Natural Diversity Database (CNDDB) and the Estero Natural Diversity Database (ENDD).

The California Natural Diversity Database (CNDDB) is from the California Department of Fish and Game's Biogeographic Data Branch:

> The CNDDB is a "natural heritage program" and is part of a nationwide network of similar programs overseen by NatureServe (formerly part of The Nature Conservancy). All natural heritage programs provide location and natural history information on special status plants, animals, and natural communities to the public, other agencies, and conservation organizations. The data help drive conservation decisions, aid in the environmental review of projects and land use changes, and provide baseline data helpful in recovering endangered species and for research projects.
>
> The goal of the CNDDB is to provide the most current information available on the state's most imperiled elements of natural diversity and to provide tools to analyze these data. (CDFG undated)

More information about the CNDDB is available online at: http://www.dfg.ca.gov/biogeodata/cnddb.

The Estero Natural Diversity Database (ENDD) is an ESRI shapefile created by San Luis Obispo County for the Landscape Architecture GIS Lab, California Polytechnic State University (1996). It was produced in May of 1995 under a county contract to update the Estero Planning Area for a more specific tracking of species, and contains general polygons of selected sensitive plants and animals in the Morro Bay area. For more information about ENDD, and to obtain ENDD ESRI files visit Cal Poly's SLO Datafinder online at: http://lib.calpoly.edu/collections/gis/slodatafinder.

SELECTED HABITAT MAPS

A total of 16 general habitats were defined for this project. They were created to aid with distribution mapping of plants and animals that are known to prefer certain habitat types over others, and to assist with distribution mapping of land birds, bats, reptiles, and other animals along with plants in which documentation exists for the area, but is limited and/or vague. The selected habitats are listed as 'Preferred Habitat' in the distribution maps of some species, and are defined in the 'Selected Habitats of the Morro Bay Area' section of this reference.

Selected habitats were produced by using NAIP 2005 aerial imagery, past State Park inventory work, ground truthing where access was allowed, and by comparing data with that of a pre-existing vegetation layer of the Estero Bay area, created by San Luis Obispo County and the Landscape Architecture GIS Lab of California Polytechnic State University (1999). The Estero vegetation layer along with attribute information is available on Cal Poly's SLO Datafinder located online at: http://lib.calpoly.edu/collections/gis/slodatafinder.

Ground truthing involved mapping specific areas by foot with the use of a handheld GPS unit (Garmin GPSMAP® 60CSx) and aerial photos printed from NAIP 2005 aerial imagery. In addition, a general overview of plant communities in the area were documented by going to the top of Black Hill in Morro Bay State Park with a set of binoculars and aerial maps to draw on.

INACCURACIES WITH HABITAT MAPPING

In general, habitats mapped within State Park properties may be more accurate due to past inventory work, and are fairly accurate in public lands due to access availability. In contrast, habitats mapped on private properties may generally be less accurate due to restriction of access for ground truthing.

Other difficulties besides property access arose when mapping vegetation for this project, which may further limit the accuracy of the preferred habitat layers created. Such inaccuracies are notably caused by habitat dynamics, human error, and scale.

Habitat Dynamics

Plant communities often form a mosaic with one to many other plant community types combined, making differentiation between the varying types difficult to determine or categorize. In addition, plant communities often intergrade over broad areas, which further limits the ability to define strict boundaries between two differing types of vegetation.

Human Error

There are a variety of human errors that may occur while mapping vegetation. Notably, certain areas of habitats mapped only with the use of aerial imagery could have been miss-identified due to differences in coloration on the aerial imagery caused by: shadows, reflections, time of year images were captured, and others. If aerial images were captured in a drought year and/or late summer, fall, or winter, as deciduous vegetation and grassland would all be dull shades of brown, making it more difficult to assess individual habitat types.

Additionally, the older the aerial imagery is, the less accurate the vegetation mapping will be. This particularly pertains to increases in rural development and habitat types that are quickly transitioning to anthropogenic communities due to the invasion of exotic species. The proliferation of highly invasive species may affect habitat mapping particularly at the small scale, where forbs such as black mustard (*Brassica nigra*) and perennial mustard (*Hirschfeldia incana*) may take over large areas of coastal scrub and grassland in less than a few years time. These areas may additionally be difficult to assess due to differences in coloration on the aerial. For instance, in the above example coastal scrub may appear as grassland on an aerial image due to potential similarities in reflection and coloration of invasive forbs with grasses.

Accuracy of any existing GIS data used as an aid to map habitats is also a potential error to consider. The Estero Vegetation data (1999) used as an aid to map selected habitats is relatively outdated. The Estero data was actually created in 1994, and many areas noted as agriculture had increased dramatically as seen on NAIP 2005 aerial imagery. In addition, the accuracy to which other habitats were mapped is relatively unknown. Keeping this in mind, the Estero Vegetation data was used only as a last resort to vouch habitats that could not be ground truthed.

Scale

The scale at which the map is portrayed also poses inaccuracies in vegetation assessment due to the amount of detail that can be assessed both at the small and large end. For example, habitats in accessible areas can be ground truthed and assessed at a very small scale with a great deal of accuracy. This may have benefits when only assessing small properties and where attention to detail is particularly necessary, however it is much more time consuming, and the accuracy and detail is often lost as the scale of the projected area increases.

Habitats on private property may only be assessed at a larger scale through the use of aerial imagery, and/or ground truthed at a distance such as from the top of Black Hill. These areas are generally less accurate and perhaps increasingly inaccurate if they are defined at a small-scale with other, more accurately mapped habitats. This resulted in a compromise of scale in which all habitat types can easily be recognized and portrayed on the same Morro Bay project area map.

In addition to these three general sources of inaccuracy, many other potential errors, human and otherwise, that are not listed in this report may arise when mapping dynamic areas such as vegetative communities. It is important to keep these listed potential errors, in addition to the possible errors not mentioned, in mind when using and referencing this work.

SOILS

Soils of the Morro Bay area were mapped using Coastal Soils data (1999) created by the County of San Luis Obispo and the National Resource Conservation Service Soil Survey Division. Soils were included to show the diversity of soil types found within the area and to further aid with distribution mapping of select plant and animal species.

For select species, preferred habitat layers were intersected with preferred soil layers to create a single polygon feature (Fig. 2). The newly created feature contains only preferred habitat where ideal soil type also occurs. This allows certain plant and animal distributions to be narrowed down to a more defined area. Where applicable, the intersected features are displayed on distribution maps of species accounts and labeled as 'Preferred Habitat & Soil'.

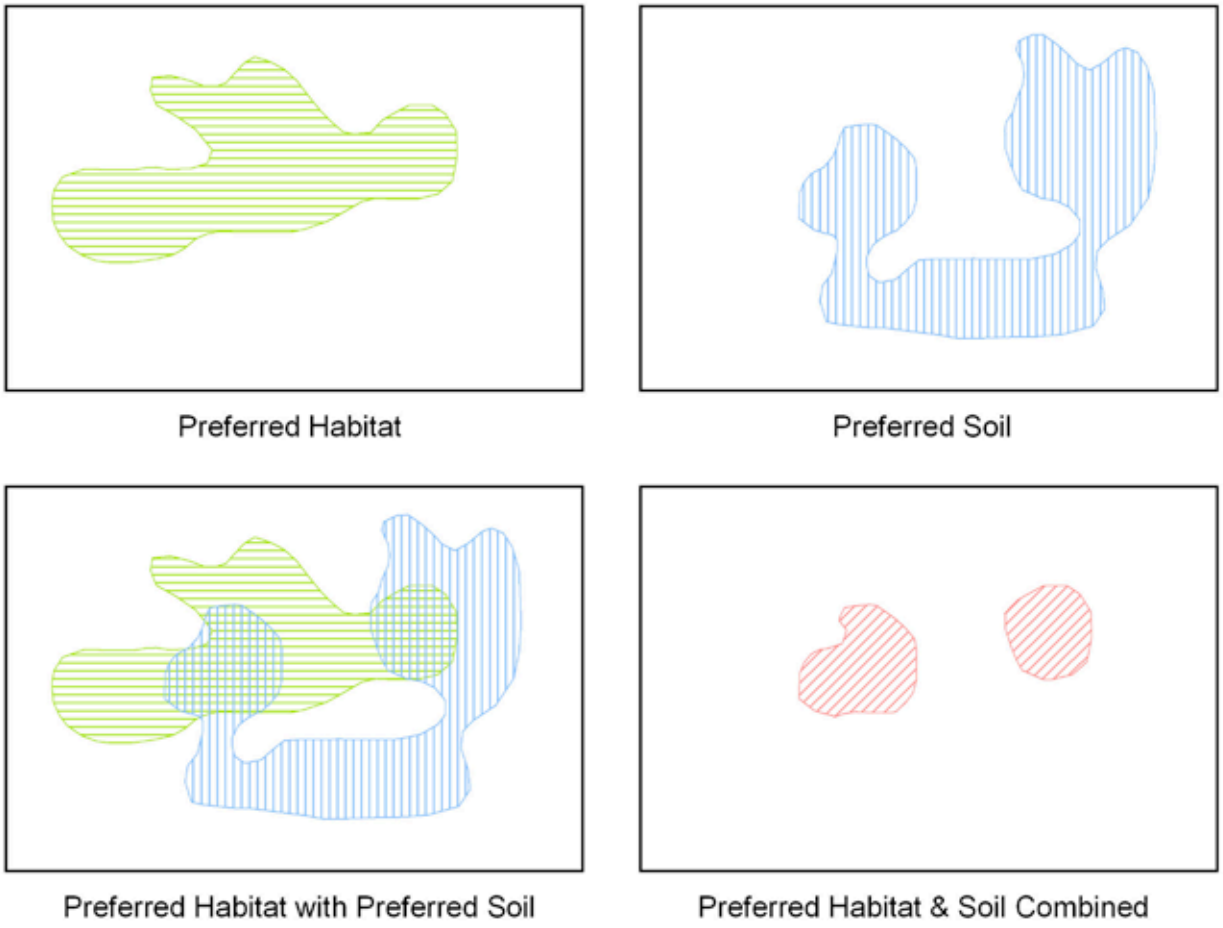

Fig. 2. Explanatory diagram of how preferred habitats were intersected with preferred soils for selected animal and plant distribution maps. Showing example of a preferred habitat polygon feature alone (top left), example of a preferred soil polygon feature alone (top right), separate preferred habitat and preferred soil polygon features together (bottom left), and the resulting polygon feature after intersecting preferred habitat and preferred soil polygons (bottom right).

SOURCES

About the Maps Literature Cited

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ESRI ArcGIS Data Sources

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Coastal Creeks and Streams (data). 1998. San Luis Obispo County Planning and Building Geographic Technology & Design. <http://lib.calpoly.edu/collections/gis/slodatafinder/>.

Coastal Soils (data). 1999. San Luis Obispo County and the National Resource Conservation Service Soil Survey Division. <http://lib.calpoly.edu/collections/gis/slodatafinder/>.

Estero Natural Diversity Database (ENDD): Estero species (data). 1996. San Luis Obispo County and Landscape Architecture GIS Lab, California Polytechnic State University. <http://lib.calpoly.edu/collections/gis/slodatafinder/>.

Estero Vegetation (data). 1999. San Luis Obispo County and the Landscape Architecture GIS Lab, California Polytechnic State University. <http://lib.calpoly.edu/collections/gis/slodatafinder/>.

National Agricultural Imagery Program (NAIP) County Mosaics (data). 2005. United States Department of Agriculture Farm Service Agency. <http://www.atlas.ca.gov/>.

Additional Online Resources

ESRI Free Data:
http://www.esri.com/data/free-data/index.html

Federal, State & Local Geographic Data:
http://gos2.geodata.gov/wps/portal/gos

San Luis Obispo County Department of Planning & Building Interactive GIS Mapping:
http://lib.calpoly.edu/collections/gis/slodatafinder/

USDA Geospatial Data Gateway:
http://datagateway.nrcs.usda.gov/

USGS Topographic Maps:
http://topomaps.usgs.gov/index.html

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Selected Habitats of the Morro Bay Area

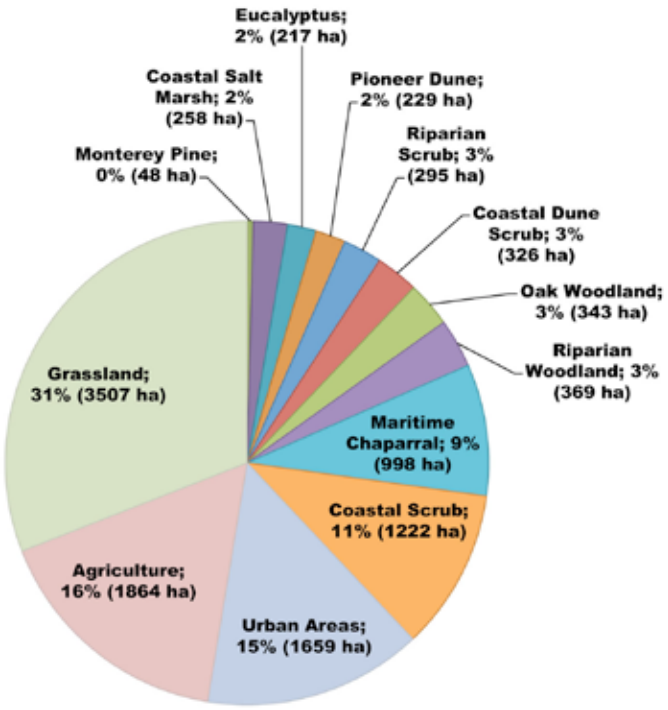
A total of sixteen habitats were selected, assessed, and mapped for this project (Fig. 4). Fourteen of the habitats are vegetative communities and include pioneer dune, coastal dune scrub, southern coastal scrub, maritime chaparral, coast live oak woodland, coastal estuarine, coastal salt marsh, freshwater marsh, valley and foothill riparian scrub, valley and foothill riparian woodland, native bunchgrass grassland combined with valley and southern coastal grassland, rock outcrop, Monterey pine, and eucalyptus. The other two habitat types are defined as agricultural and rural developed areas, and urban areas.

Eleven of the fourteen vegetative habitats consist mostly of native flora, while the other three (grassland, Monterey pine, and eucalyptus) are comprised mostly of non-native species. Agricultural and urban areas are classified as habitats for mapping purposes, as certain sensitive species are known to occur in these communities (i.e. bats occur in urban areas and many birds frequent agricultural fields).

The habitats were selected based on how common they occur in the Morro Bay area, and most are defined from *California Vegetation* by Holland and Keil (1995). Several other habitat types occur in the Morro Bay area, but were left out of habitat maps for this project. These include subtidal and intertidal communities, dune wetland, coastal sea-bluff scrub, and many sub-category plant communities such as coastal seral dune communities, coastal dune swale, alkali coastal dune swale, and others. Such habitats make up a very small, yet important component of the Morro Bay area. They were not selected as habitats to include on distribution maps, as they would not be distinguishable due to the map scale (please see Scale and Inaccuracies with Habitat Mapping in the 'About Maps' section on pages 29 and 31 respectively). Instead, these habitats were lumped into more commonly recognized and broader plant communities defined in subsequent pages of this section.

Hectare estimates of selected habitats within the Morro Bay project area were also gathered for general information purposes (Fig. 3), and can be used to get a better understanding of the most widespread to least common habitats encountered.

Fig. 3. Pie chart showing percent coverage and approximate hectares of selected habitats within the Morro Bay project area. The total hectares displayed adds up to approximately 323 hectares more than the total of 10,967 approximate hectares allocated for the project area. This is due to overlapping features such as riparian woodland, riparian scrub, and eucalyptus, which occur over large portions of agricultural and urban areas. Rock outcrop and freshwater marsh habitat were not included on the chart for this very reason, as they occur within many different habitat types. (Hectare approximations were generated by the use of ESRI ArcGIS Desktop 9.2. Pie chart was created using Microsoft Excel 2008 for Mac).



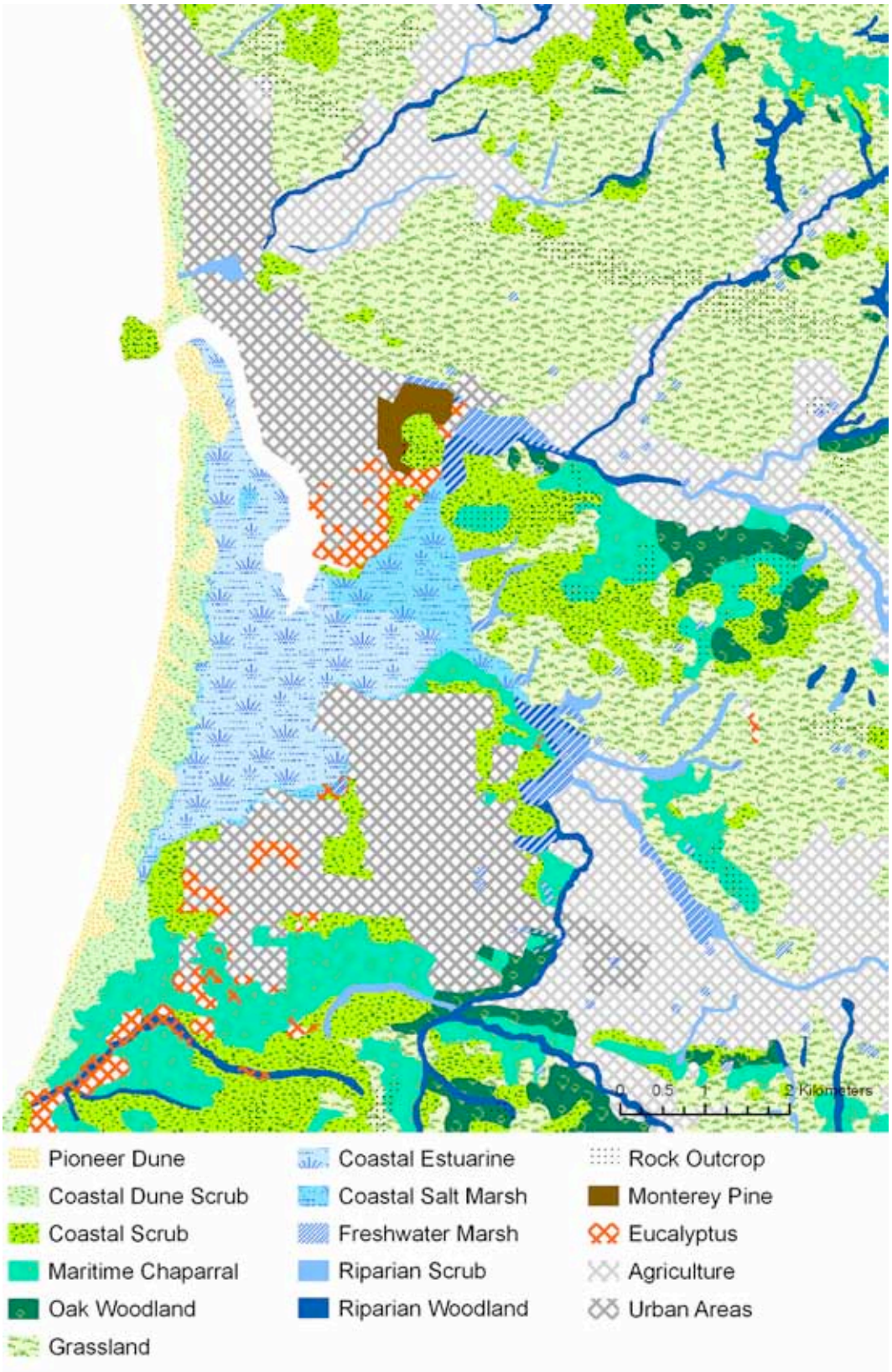


Fig. 4. Selected habitats within the Morro Bay project area. Clarification of legend items: coastal scrub equals southern coastal scrub, oak woodland equals coast live oak woodland, grassland equals valley and southern coastal grassland along with occasional native bunchgrass grassland, and riparian scrub/woodland equals valley and foothill riparian scrub/woodland.

PIONEER DUNE

Pioneer dune communities are often described as coastal strand, and are zones of unstable sand that occur on beaches and active dunes close to the ocean. Due to harsh environmental conditions such as salt spray, water inundation, high winds, and sand blowouts, these communities usually have low species diversity. Most plants in this community type are prostrate herbs with small and often succulent leaves, and extensive roots and creeping stems that are able to root at the nodes (Holland and Keil 1995).

Pioneer dune along sandspit of Montaña de Oro State Park, San Luis Obispo County, California.

Strand and pioneer dunes in closest proximity to the beach and high tide line have only the most salt-tolerant plant species, including sand verbenas (*Abronia* spp.), beach saltbush (*Atriplex leucophylla*), beach-bur (*Ambrosia chamissonis*), and non-native sea rocket (*Cakile maritima*) (Holland and Keil 1995). Along with a low diversity of plant species, these areas have an accumulation of uprooted marine algae, driftwood and other debris, and include common wrack-line seaweeds such as giant kelps (*Macrocystis* spp.), bull kelps (*Nerocystis* spp.), rock kelps (*Fucus* spp.), feather boas (*Egregia* spp.), and sea lettuce (*Ulva* spp.). The mounds of washed-up seaweed provide food and habitat for many invertebrate species and also food for vertebrates such as birds (Walgren et al. 2005).

Pioneer dune on sandspit of Montaña de Oro State Park, San Luis Obispo County, California (note Morro Rock in right background as reference).

Above the high tide line, sand begins to accumulate and create foredunes. These areas become less influenced by salt spray with increasing distance from the beach, and plant species composition and diversity increases (Holland and Keil 1995). Common native coastal strand and pioneer dune species of the Morro Bay area include:

Abronia latifolia	yellow sand-verbena
Abronia maritima	beach sand-verbena
Abronia umbellata	purple sand-verbena
Achillea millefolium	yarrow
Ambrosia chamissonis	beach-bur
Atriplex leucophylla	beach saltbush
Camissonia cheiranthifolia	dune evening primrose
Croton californicus	croton
Malacothrix incana	dunedelion

In addition to native plants, there are a number of introduced species that are widespread on strand and pioneer dune habitat throughout the area, including ice plant (*Carpobrotus chilensis* and *C. edulis*) and European beach grass (*Ammophila arenaria*). Non-native species such as these are of particular concern as they are capable of readily displacing the few native species that inhabit such a harsh environment.

COASTAL DUNE SCRUB

Coastal dune scrub of Montaña de Oro State Park, San Luis Obispo County, California.

In areas where foredunes become well established, strand and pioneer dune communities grade into coastal dune scrub communities. These communities are successionally older and have much more stable and fertile soils than pioneer dunes; containing a greater amount of organic matter, higher water holding capacity, and a much lower salt content. In addition, they have reduced reflectivity and temperature fluctuation of the soil compared to pioneer dunes, due to more shade and litter from vegetation (Holland and Keil 1995). These differences generally allow for greater species diversity within coastal dune scrub communities compared to those of coastal strand and pioneer dune.

Coastal dune scrub of Coleman Park in Morro Bay, California.

Coastal dune scrub communities within the Morro Bay area make up the dominant habitat type of the Morro Dunes Complex. This complex runs north to south from Cayucos to Montaña de Oro State Park, with small disjunctive dune system at Villa Creek of Estero Bay State Property in the north. These communities are largely dominated by shrubby vegetation that is typically taller and denser than coastal strand and pioneer dune communities (Holland and Keil 1995). Common subshrub and shrub species of coastal dune scrub in the Morro Bay area include:

Artemisia californica	California sagebrush
Baccharis pilularis	coyote bush
Ericameria ericoides	mock heather
Eriogonum parvifolium	coastal buckwheat
Eriophyllum staechadifolium	coastal golden yarrow
Isocoma menziesii	goldenbush
Lessingia filaginifolia	California aster
Lotus scoparius	deerweed
Lupinus arboreus	tree lupine
Lupinus chamissonis	coastal silver lupine
Salvia mellifera	black sage

In addition to these shrubs and subshrubs, there are many native herbaceous species present in this habitat type as well. These include many of the species that occur in coastal strand and pioneer dune communities previously mentioned, in addition to the following common herbaceous species:

Chenopodium californicum	California goosefoot
Erigeron blochmaniae	Blochman's leaf-daisy
Erysimum insulare suffrutescens	wallflower
Eschscholzia californica	California poppy
Helianthemum scoparium	rush-rose

Horkelia cuneata	horkelia
Marah fabaceus	wild cucumber
Senecio blochmaniae	Blochman's groundsel

The coastal dune scrub of Morro Strand State Beach is significantly less diverse than dune communities found at Montaña de Oro State Park. This is presumably from direct human impacts and the spread of European beach grass (*Ammophila arenaria*). Native species not found at Morro Strand State Beach, but present at Montaña de Oro State Park include: American dune grass (*Leymus mollis*), woolly gilia (*Eriastrum densifolium*), beach spectacle pod (*Dithyrea maritima*), dunedelion (*Malacothrix incana*), and sea lettuce (*Dudleya caespitosa*). Many of these native species are being re-introduced into Morro Strand State Beach as part of State Park restoration efforts (Walgren et al. 2005).

A number of introduced species also occur throughout coastal dune scrub communities in the area, including ice plant (*Carpobrotus chilensis* and *C. edulis*) slender-leaved ice plant (*Conicosia pugioniformis*), European beach grass (*Ammophila arenaria*), and veldt grass (*Ehrharta calycina*). Among these species veldt grass is perhaps the most readably notable invasive plant in dune scrub of Montaña de Oro State Park, and is rapidly transitioning native coastal dune scrub habitat into non-native coastal grassland.

SOUTHERN COASTAL SCRUB

Southern coastal scrub, or 'soft chaparral', is most commonly associated with steep slopes and moderately xeric environments. These areas typically have a shallow soil profile and water is most commonly available in the upper horizons during the winter and spring (Bakker 1971). Many coastal scrub plants are semi-woody, many branched, and drought deciduous. This community supports a canopy ranging from 0.5-2.5 meters on average, with a variety of understory forbs (Holland and Keil 1995).

Southern coastal scrub of Morro Bay State Park. Foreground species include: *Salvia mellifera*, *Artemisia californica*, *Toxicodendron diversilobum*, and *Mimulus aurantiacus*.

Southern coastal scrub communities are adapted to fire (Raven and Axelrod 1978); many coastal scrub species have volatile oils, can stump sprout, or have seeds that require fire scarification and enriched nutrient availability before germination can occur (Holland and Keil 1995). In southern coastal scrub communities, both shrubby and herbaceous species are the most diverse and abundant in the years that immediately follow a fire.

Southern coastal scrub is the second largest vegetative plant community in the Morro Bay area, typically dominating north-facing slopes, and also occupying ditches, ravines and roadsides. Southern coastal scrub may ecotone with nearly every habitat type in the area.

Southern coastal scrub of Morro Bay State Park. Dominated by *Baccharis pilularis*, *Salvia mellifera*, and *Artemisia californica*.

Dominant shrubs and subshrubs of southern coastal scrub in the Morro Bay area include:

Artemisia californica	California sagebrush
Baccharis pilularis	coyote bush
Ceanothus cuneatus	buckbrush
Eriogonum fasciculatum	California buckwheat
Eriogonum parvifolium	coastal buckwheat
Eriophyllum confertiflorum	golden yarrow
Eriophyllum staechadifolium	coastal golden yarrow
Hazardia squarrosa	saw-toothed goldenbush
Lessingia filaginifolia	California aster
Lotus scoparius	deerweed
Lupinus albifrons	bush lupine
Mimulus aurantiacus	sticky monkey-flower
Rhamnus californica	California coffee-berry
Rhamnus crocea	redberry
Rubus ursinus	wild blackberry
Salvia mellifera	black sage
Scrophularia californica	California figwort
Toxicodendron diversilobum	poison oak

Common herbs of southern coastal scrub in the Morro Bay area include:

Achillea millefolium	yarrow
Calystegia macrostegia	common morning-glory
Dudleya lanceolata	lanceleaf liveforever
Epilobium canum canum	California fuchsia
Eschscholzia californica	California poppy
Galium porrigens	shrubby bedstraw
Gnaphalium spp.	everlasting
Horkelia cuneata	horkelia
Pteridium aquilinum	bracken fern
Stachys bullata	common hedge-nettle

MARITIME CHAPARRAL

Maritime chaparral is the third dominant terrestrial plant community of the Morro Bay project area. This community type typically inhabits sandy soils of old stabilized sand dunes throughout windswept coastal areas of central and northern California (Holland and Keil 1995). More inland chaparral communities, such as manzanita chaparral and *Ceanothus* chaparral, that generally occur on relatively deep, fertile soils were included as maritime chaparral for this project.

Maritime chaparral of Los Osos Oaks Reserve. Species in photo include *Ericameria ericoides* and *Ceanothus cuneatus* in foreground and *Adenostoma fasciculatum* in background.

Maritime chaparral often forms a mosaic with coastal prairie, coastal dune scrub, coastal scrub, and coast live oak woodland in southern California (Holland and Keil 1995). This is analogous to maritime chaparral within the Morro Bay area, and in addition to the formation of these many plant community mosaics, this community type often forms sharp ecotones with eucalyptus in Montaña de Oro State Park.

Maritime chaparral of Montaña de Oro State Park. Dominated by *Arctostaphylos morroensis* with a eucalyptus grove in background.

On average, the dominant plants of maritime chaparral range from prostrate shrubs of only a few centimeters tall to large shrubs of 2-3 meters tall (Holland and Keil 1995). Maritime chaparral of the Morro Bay area falls in line with this average, with some areas of manzanita chaparral reaching vegetative heights of four meters or more. These areas often lack an understory; with herbaceous species possibly present where shrub cover is incomplete, to nearly non-existent in dense patches of chaparral (Holland and Keil 1995).

Common species of maritime chaparral within the Morro Bay area include:

Adenostoma fasciculatum	chamise
Arctostaphylos spp.	manzanita
Ceanothus cuneatus	buckbrush
Ericameria ericoides	mock heather
Eriogonum fasciculatum	California buckwheat
Heteromeles arbutifolia	toyon
Prunus ilicifolia	holly-leaved cherry
Rhamnus californica	California coffeeberry
Rhamnus crocea	redberry
Salvia mellifera	black sage
Toxicodendron diversilobum	poison oak
Quercus agrifolia	coast live oak
Quercus wislizenii	interior live oak

COASTAL LIVE OAK WOODLAND

Coastal live oak woodland is perhaps the most mesic of the foothill woodland communities of California (Holland and Keil 1995). They are dominated by *Quercus agrifolia* and often intergrade with grassland, southern coastal scrub, maritime chaparral, and valley and foothill riparian woodland throughout the Morro Bay area.

Given that *Quercus agrifolia* is an evergreen species that forms a dense canopy, the ground level within a dense stand is very shady. Such shaded areas within this community type may lack an understory, or have a sparse understory consisting of shade tolerant species (Holland and Keil 1995).

The shrubby and herbaceous understory of coastal live oak woodland varies greatly in more exposed, drier areas in which soils are also typically shallower (Holland and Keil 1995). In addition, coastal live oak woodlands may typically contain understory species that are the same as common species of their adjacent plant communities. For example where coast live oak woodlands intergrade with grasslands the understory may consist almost entirely of grassland species, and where they intergrade with coastal scrub the understory may consist mostly of coastal scrub species, etcetera (Holland and Keil 1995).

Coast live oak woodland of Los Osos Oaks Reserve. Featuring understory of *Pteridium aquilinum*, *Rubus ursinus*, and *Toxicodendron diversilobum* among others.

Common shade tolerant herbaceous species of coast live oak woodland within the Morro Bay area include:

Claytonia perfoliata	miner's lettuce
Galium spp.	bedstraw
Marah fabaceus	wild cucumber vine
Pholistoma auritum	common fiesta flower
Polypodium californicum	California polypody fern
Pteridium aquilinum	bracken fern
Salvia spathacea	hummingbird sage
Stachys bullata	common hedge-nettle

Typical shade tolerant shrubs of coast live oak woodland understory within the Morro Bay area include:

Heteromeles arbutifolia	toyon
Rhamnus californica	California coffee-berry
Ribes spp.	gooseberries and currents
Rubus ursinus	wild blackberry
Symphoricarpos mollis	snowberry
Toxicodendron diversilobum	poison oak

NATIVE BUNCHGRASS GRASSLAND

Native grasslands are thought to have initially covered about 25% of California prior to the late 1800's, with a historical distribution similar to that of grasslands present today. Many of the grasslands of California were plowed for dry-land farming, urban construction, oil well drilling, highways, and other human caused modifications (Holland and Keil 1995). The remaining native bunchgrass grasslands within the Morro Bay area have an uncommon patchy distribution throughout valley and southern coastal grassland, and were thus lumped into the latter community type for this reference.

Small local population of *Nassella* grassland adjacent to coastal scrub in Morro Bay State Park, with *Avina barbata* in background.

Native bunchgrass grasslands mostly exist as patches of needlegrass (*Nassella pulchra* and *N. lepida*) in Morro Bay State Park, with occasional and locally common populations typically occurring on rock outcrops, along mild slopes of drainages and eroded hillsides, and particularly along fringes of coastal scrub. In addition, native bunchgrasses are often common to serpentine soils, which tend to lack competition among non-native species, as many are unable to tolerate the low nutrients and high mineral content (Holland and Keil 1995).

Small local population of *Nassella* grassland adjacent to coastal scrub in Morro Bay State Park.

Along with *Nassella* spp., other native bunchgrasses occur in the area, but never dominate grasslands, and typically occur as occasional within many other plant communities throughout the area including southern coastal scrub, coast live oak woodland, valley and foothill riparian, and along fringes of freshwater marsh.

Some native perennial grasses that occur in the Morro Bay area include:

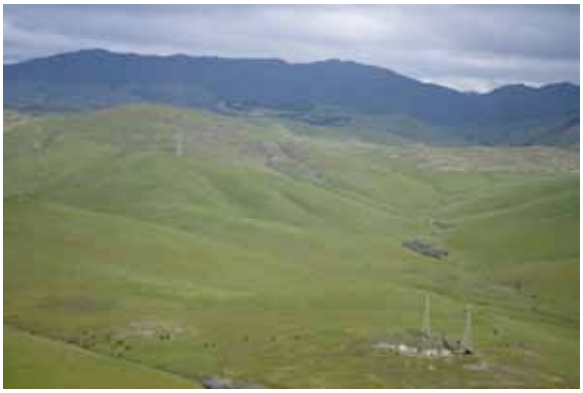
Danthonia californica	California oatgrass
Elymus glaucus	blue wild-rye
Hordeum brachyantherum	meadow barley
Leymus condensatus	giant wild rye
Leymus mollis	American dunegrass
Melica californica	California melic grass
Melica imperfecta	melic grass
Nassella lepida	slender needlegrass
Nassella pulchra	purple needlegrass
Phalaris californica	California canarygrass

VALLEY AND SOUTHERN COASTAL GRASSLAND

Valley and southern coastal grassland consists mostly of grasses and forbs introduced during and since the Spanish colonial period, and often have a noteworthy component of native California forbs (Holland and Keil 1995). This is the largest community type within the Morro Bay area, dominating areas east of the City of Morro Bay and north of Morro Bay State Park, along with areas east of Los Osos and Baywood Park.

Southern coastal grassland of Morro Bay State Park, dominated by *Avena barbata*.

Most valley and southern coastal grassland in the area, except for that of Morro Bay State Park, is currently used as graze land for cattle. These non-native grasslands host a variety of annual grass species that are native to the Mediterranean region, and dominance of particular genera varies from site to site. They also contain a variety of introduced forbs, which may become dominant in areas of disturbance and areas with higher amounts of water concentration. Such areas include roadsides, ditches, margins of manmade structures, and other areas with a variety of past and present disturbance.



Valley and southern coastal grassland east of City of Morro Bay.

The most common introduced grasses of valley and southern coastal grassland within the Morro Bay area include:

Avena barbata	slender wild oats
Avena fatua	common wild oats
Brachypodium distachyon	false brome
Bromus diandrus	rip-gut brome
Bromus hordeaceus	soft chess brome
Bromus madritensis rubens	red brome
Hordeum murinum	foxtail barley
Lolium multiflorum	annual ryegrass
Vulpia myuros	rat-tail fescue

Common introduced forbs include filarees (*Erodium* spp.), mustards (*Brassica* spp. and *Hirschfeldia incana*), bristly ox tongue (*Picris echioides*) and various thistles (*Carduus* spp., *Cirsium vulgare*, *Hypochaeris* spp., *Sonchus* spp., and others). Native annual and perennial herbs also occur, and may be dominant or aspect dominant in favorable growing seasons (Holland and Keil 1995). Some common native wildflowers encountered in grasslands of the Morro Bay area include:

Amsinckia spp.	fiddleneck
Camissonia ovata	sun cup
Castilleja spp.	Indian paintbrush and owl's clover
Cryptantha spp.	cryptantha
Eschscholzia californica	California poppy
Lasthenia californica	common goldfields

Lepidium spp.	pepper-cress
Lomatium spp.	biscuit-root
Lupinus spp.	lupine
Plantago erecta	English plantain
Ranunculus californicus	California buttercup
Sisyrinchium bellum	blue-eyed grass
Trifolium spp.	clover

COASTAL ESTUARINE

Coastal estuarine communities occur where sea water mixes with fresh water from streams in a protected embayment. These areas are characterized as having brackish waters with varying degrees of salinity, protection from wave action and winds, and a thick layer of sediments along the bottom that often form a thick mud (Holland and Keil 1995). Coastal estuarine habitat covers the entirety of the Morro Bay Estuary, from near the Morro Bay State Park Museum of Natural History south, and along the entire eastern side of the sandspit of Montaña de Oro State Park. These areas intergrade with coastal salt marsh communities throughout, and also occur up coastal portions of Chorro and Los Osos Creek and the various steams and tributaries between them, along with Sweet Springs Natural Preserve.

Morro Bay Estuary at low tide, with *Salicornia virginica* and algae in foreground.

Morro Bay Estuary at low tide.

The plants of coastal estuarine communities are generally soft-bodied, flexible, and subjected to prolonged inundation. The variation in salinity of coastal estuarine communities is result from daily fluctuations of high and low tides along with seasonal fluctuations. Rainy winter months generally dilute the salt content of estuarine communities as fresh water drains from land, and in summer months stream flow decreases and salinity increases (Holland and Keil 1995).

Common plants of coastal estuarine communities within the Morro Bay Estuary include eel-grass (*Zostera marina*), which is generally in areas of high salinity; and ditch-grass (*Ruppia maritima*), which is generally restricted to brackish streams of lower salinity. Along with these flowering plants, various algae occur, with the most conspicuous species being cladophora (*Cladophora* spp.) and sea-lettuce (*Ulva lactuca*) (Holland and Keil 1995).

COASTAL SALT MARSH

Coastal salt marshes occur in bays and other areas protected from open ocean where there is mixing of freshwater from streams and springs with salt water from the ocean. They often intergrade with estuarine communities, and are subject to periodic inundation (unlike prolonged inundation of coastal estuarine communities) (Holland and Keil 1995). Coastal salt marshes occur throughout fringes of the Morro Bay Estuary, conspicuously at Shark's Inlet of Montaña de Oro State Park, Sweet Springs Nature Preserve, and throughout southern and central western Morro Bay State Park.

Coastal salt marsh (and estuarine) community of Morro Bay State Park along southwest side of Turri Road.

Species diversity within coastal salt marsh tends to be relatively lower than other communities because few species can tolerate the high amounts and fluctuations of salinity. Plants of coastal salt marsh are mostly herbaceous perennials that are halophytic (adapted to growing in saline conditions), and generally short statured with reduced leaves. In addition, many species of this community type have aerenchyma (tissues with many air cavities), which allow plants to respire in environments with low oxygen, and some species have salt glands that allow excess salts to be excreted. Other species have cells that contain high concentrations of dissolved solutes, allowing them to absorb water without osmotic imbalances (Holland and Keil 1995).

Coastal salt marsh of Sweet Springs Nature Preserve with *Juncus acutus* in fore and background, and *Salicornia virginica* dominating throughout center.

Some common native plants of coastal salt marsh within the Morro Bay area include:

Atriplex californica	California saltbush
Atriplex triangularis	spearscale
Carex obnupta	slough sedge
Distichlis spicata	saltgrass
Frankenia salina	alkali heath
Jaumea carnosa	fleshy jaumea
Juncus acutus	giant rush
Juncus lesueurii	creeping rush
Limonium californicum	sea lavender
Potentilla anserina	coastal silverleaf
Salicornia virginica	pickleweed
Scirpus americanus	American three-square
Scirpus pungens	common three-square
Triglochin concinna	arrowgrass

FRESHWATER MARSH

Freshwater marshes are characterized as areas with nutrient rich mineral soils that are saturated through most or all of the year, and are best developed in areas with slow moving or stagnant shallow water. These communities occur along margins of slow moving streams, rivers, flood plains, ponds, and along hillsides where seepage from springs occur (Holland and Keil 1995). In the Morro Bay area freshwater marshes take place in all these location types as well as reservoirs. The three largest occurrences of this habitat type in the Morro Bay area are at northern Morro Bay State Park (MBSP) just east of Black Hill, an area adjacent to southeastern MBSP (east of Powell State Property), and at Warden Lake. Freshwater marsh also occurs at Sweet Springs Nature Preserve and many other scattered locations throughout the area.

Freshwater marsh of Sweet Springs Nature Preserve, with annual grass and *Potentilla anserina* in foreground and *Juncus acutus* in background.

Freshwater marsh (flood plain) of northeastern Morro Bay State Park, intergrading with riparian scrub.

Marshes often have anaerobic or nearly anaerobic soils due to water filling soil particles, and from respiration of bacteria and other microorganisms that decompose organic matter. The anaerobic conditions also result in the production of toxic by-products, and the combination of these factors reduces the amount of higher plants that can grow in marsh soils. Such plants that can tolerate the conditions of marsh environments consist mostly of perennial monocots that can reproduce by underground rhizomes (Holland and Keil 1995).

Common native freshwater marsh monocot species within the Morro Bay area include:

Carex praegracilis	field sedge
Carex obnupta	slough sedge
Eleocharis spp.	spike-rush
Juncus spp.	rush
Lemna minor	duckweed
Scirpus spp.	sedge
Typha latifolia	broadleaf cattail

Some common native dicot species of freshwater marsh within the Morro Bay area include:

Anemopsis californica	yerba mansa
Epilobium ciliatum	willow-herb
Hydrocotyle verticillata	marsh pennywort
Mimulus guttatus	common monkeyflower
Rorippa nasturtium-aquaticum	watercress
Oenanthe sarmentosa	marsh-parsley
Polygonum spp.	smartweed
Potentilla anserina	coast silverleaf

VALLEY AND FOOTHILL RIPARIAN SCRUB

Valley and foothill riparian scrub habitats are areas in which riparian shrubs dominate and form dense thickets that are often very difficult to move through or impenetrable by humans without vegetation removal. They often intergrade with, and contain many of the same species as valley and foothill riparian woodland communities, but typically lack the dominance of multiple large tree species. Valley and foothill riparian scrub occupies creeks and ravines throughout the Morro Bay area, and also commonly occurs along fringes of freshwater marsh and valley and foothill riparian woodland habitat.

Riparian scrub of northern Morro Bay State Park, which is dominated by *Salix lasiolepis* and intergrading with riparian woodland.

The extent of riparian scrub communities, as with riparian woodlands, depends on the size and nature of flood plains and banks, the amount of water carried by the stream, and very importantly on the lateral extent and depth of subterranean aquifers (Holland and Keil 1995). In the Morro Bay area, riparian scrub is dominated by *Salix lasiolepis*, which becomes the only large woody species present in some areas.

Riparian scrub southwest of Lila Keiser Park in Morro Bay.

Common shrubs and subshrubs of valley and foothill riparian scrub (and riparian woodland) communities in the Morro Bay area include:

Baccharis salicifolia	marsh baccharis
Cornus sericea	American dogwood
Heteromeles arbutifolia	toyon
Rhamnus californica	California coffeeberry
Ribes spp.	gooseberries and currents
Rosa californica	California wild rose
Rubus parviflorus	thimbleberry
Rubus ursinus	blackberry
Salix lasiolepis	arroyo willow
Sambucus mexicana	elderberry
Scrophularia californica	figwort
Toxicodendron diversilobum	poison oak

In addition to these common shrubs, many herbaceous and woody vines are sometimes present in riparian scrub (and riparian woodland) habitats throughout the area, including:

Clematis ligusticifolia	virgin's bower
Lonicera spp.	honeysuckle
Marah fabaceus	wild cucumber
Toxicodendron diversilobum	poison oak
Vicia gigantea	giant vetch

VALLEY AND FOOTHILL RIPARIAN WOODLAND

Valley and foothill riparian woodland is adjacent or near to flowing water and/or subterranean aquifers. It is composed of woody hydrophilic plants, generally as willows (*Salix* spp.), which create a canopy.

California's riparian communities are difficult to classify due to their diversity and complexity, along with great alterations inflicted by human activities (Holland and Keil 1995). Riparian habitat throughout the Morro Bay area is perhaps best categorized as valley and foothill riparian, formed by coastal creeks and streams. These habitats may traverse areas of grassland, coastal scrub, chaparral, and other communities as streams work their way towards the coast, and some of the species of these contiguous communities often become part of the riparian habitat (Holland and Keil 1995).

Valley and foothill riparian woodland along Los Osos Creek adjacent to Los Osos Oaks Reserve.

Common trees and large shrubs of valley and foothill riparian woodland in the Morro Bay area include:

Heteromeles arbutifolia	toyon
Platanus racemosa	sycamore
Populus balsamifera trichocarpa	black cottonwood
Rhamnus californica	California coffeeberry
Salix lasiolepis	arroyo willow
Sambucus mexicana	elderberry
Quercus agrifolia	coast live oak
Umbellularia californica	California bay laurel

In addition to these large woody plants, many other shrubs, vines, and herbaceous species frequently occur in valley and foothill riparian woodland habitat throughout the area. These species may include all those commonly found in valley and foothill riparian scrub habitat in addition to others.

ROCK OUTCROP

Rock outcrop within coastal scrub of Morro Bay State Park, with *Ericameria ericoides*, *Toxicodendron diversilobum* and others.

Rock outcrops often lack trees and large shrubs due to a number of limiting environmental factors, and shrubs within this community type are typically dwarfed in size compared to the same or similar species within adjacent habitat. This is notably due to inadequacies in nutrients and water content throughout thin layers of soil, along with the presence of solid or densely packed rock that forms an impermeable layer for plant roots to grow. This community type often coincides with serpentine soils throughout the Morro Bay area, which further limits certain plant species to grow.

Rock outcrops throughout coastal scrub of Cerro Cabrillo (left) and two unnamed hills in Morro Bay State Park.

The herbaceous layer throughout rock outcrop differs between the vegetative communities it occurs in, however lichens and club mosses tend to colonize rock outcrop regardless. Rock outcrops in grasslands tend to have an herbaceous layer consisting primarily of grasses and wildflowers, while those in coastal scrub and maritime chaparral may have associated shrubs in addition to herbaceous species.

Common native herbaceous species in rock outcrop of grasslands throughout the Morro Bay area include:

Amsinckia spp.	fiddleneck
Chorizanthe spp.	spineflower
Clarkia spp.	farewell to spring
Crassula connata	pigmy-weed
Cryptantha spp.	cryptantha
Dichelostemma capitatum	blue-dicks
Gilia spp.	gilia
Gnaphalium spp.	everlasting
Lepidium spp.	pepper-cress
Plagiobothrys spp.	popcorn flower
Plantago erecta	English plantain
Thysanocarpus curvipes	fringe-pod

Rock outcrops in coastal scrub communities throughout the Morro Bay area are typically more diverse, and in addition to associated shrub species, they typically also include dudleya (*Dudleya* spp.), phacelia (*Phacelia* spp.), chia (*Salvia columbariae*), and many other herbaceous species.

MONTEREY PINE

Monterey pines (*Pinus radiata*) are native to the Monterey Peninsula, Cambria, and a few islands off of Baja California. Hoover (1970) describes Pico Point of San Simeon as the northern most native stand along the coast of San Luis Obispo County. Monterey pines are cultivated throughout portions of the City of Morro Bay, with the largest population occurring on Black Hill of Morro Bay State Park. State Park Supervisor John Fleming sowed the plantation on Black Hill, noted as "Fleming's Forest", in 1958 from 1,200 Monterey pine saplings (Landwehr 2001).

Many Monterey pines throughout California, as with those of Black Hill, are now ultimately facing death due to an introduced fungal disease known as Pine Pitch Canker. Stands of dead and dying trees throughout Black Hill are currently being removed in attempt to suppress the disease, as well as for safety from falling dead snags and fire suppression.

Common species within Monterey pine habitat of Black Hill includes mostly non-native annual grasses, poison oak (*Toxicodendron diversilobum*), and occasionally a few coastal scrub species in areas of open canopy.

Monterey pine at Black Hill of Morro Bay State Park.

EUCALYPTUS

Eucalyptus is a genus of tree species in the Myrtaceae family that is almost entirely native to Australia. They were introduced to California in the 1850's, but didn't boom until the early 1900's when it was hoped they would provide a renewable source of timber for many applications. These hopes failed when it was found that the trees split and warp after harvest in California, as apposed to those of old virgin forests of Australia (Santos 1997).

Blue gum (*Eucalyptus globulus*) is the most common eucalyptus tree throughout the Morro Bay area. Other species include red gum (*E. camaldulensis*), mealy stringybark (*E. cephalocarpa*), sugar gum (*E. cladocalyx*), and manna gum (*E. viminalis*). The largest stand of eucalyptus plantings in the area is at Montaña de Oro State Park, where species of blue gum can be seen growing in cultivated rows throughout the park entrance to the north.

Beginning of eucalyptus habitat along margin of maritime chaparral in Montaña de Oro State Park, with *Arctostaphylos morroensis* in understory.

Eucalyptus trees may be heavily impacting native plant communities throughout the area, especially in Montaña de Oro State Park. Blue gum (*E. globulus*) has an overall rating of 'Moderate' in the Invasive Plant Inventory of the California Invasive Plant Council (Cal-IPC), which also notes that its impacts can be much higher in coastal areas. The only other eucalyptus species in the Cal-IPC inventory to date is red gum (*E. camaldulensis*), which has a rating of 'Limited' (Cal-IPC 2006). Thorough presence/presence not detected surveys conducted for the Morro shoulderband snail (*Helminthoglypta walkeriana*) and Morro manzanita (*Arctostaphylos morroensis*) throughout eucalyptus habitat of Montaña de Oro State Park resulted in no Morro shoulderband snail presence, and presence of Morro manzanita only along immediate margins of eucalyptus habitat. The same surveys conducted in native communities adjacent to eucalyptus habitat resulted in both species being encountered in several different locations.

Common native plant species within eucalyptus habitat include poison oak (*Toxicodendron diversilobum*).

AGRICULTURAL AND RURAL DEVELOPED AREAS

Agricultural and rural developed areas occupy the second largest amount of coverage in the Morro Bay area (second to grassland). These areas typically occupy large valleys to the east of the City of Morro Bay and the town of Los Osos, and often lie adjacent to grassland that is used for cattle grazing.

Agricultural field along Los Osos Valley Road, east of the town of Los Osos.

Agricultural areas often form agrestal plant communities. Agrestal communities take place in areas that are disturbed by cultivation, and contain many weedy species that are able to thrive in the same environment of crop plants. Small proportions of croplands are occupied by agrestal communities at any given time, however almost all of these areas have at one time or another been occupied by weed communities (Holland and Keil 1995).

The weedy species of agrestal communities varies from crop to crop, and broadleaf crops may support abundant broadleaf weedy species, while grain crops may support many weedy grasses. In addition, many of the weeds of agrestal crops are genetically variable and have local races that have been selected based on human activities that were ultimately designed to control weeds or enhance growth of crops. For instance, mechanical harvesting of crops has promoted growth of weeds containing seeds that can be spread by the machinery (Holland and Keil 1995).

The most conspicuous weeds of agrestal communities within the Morro Bay area are mustards, including black mustard (*Brassica nigra*) and perennial mustard (*Hirschfeldia incana*).

URBAN AREAS

Urban areas cover about the same amount of space as agricultural and rural developed regions in the Morro Bay area. These areas were mapped as habitat in order to show the general distribution of certain sensitive species. This includes sensitive bird species such as Allen's Hummingbird (*Selasphorus sasin*), which may nest in trees and shrubs of urban landscaping, in addition to many sensitive bats, which often roost under rooftops and in crevices of buildings and structures throughout urban areas.

City of Morro Bay.

Urban areas often consist of "urban mix" plant communities, in which mixtures of non-native and native plants occur in open areas adjacent to urban and residential development (Holland and Keil 1995). These areas occur throughout the City of Morro Bay and town of Los Osos and Baywood Park, and were not mapped as separate plant communities. Common tree species within developed areas of Morro Bay and Los Osos include eucalyptus (*Eucalyptus* spp.), Monterey pine (*Pinus radiata*), Monterey cypress (*Cupressus macrocarpa*), and many others.

Town of Los Osos and Baywood Park in background.

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MORRO SHOULDERBAND SNAIL
Helminthoglypta walkeriana

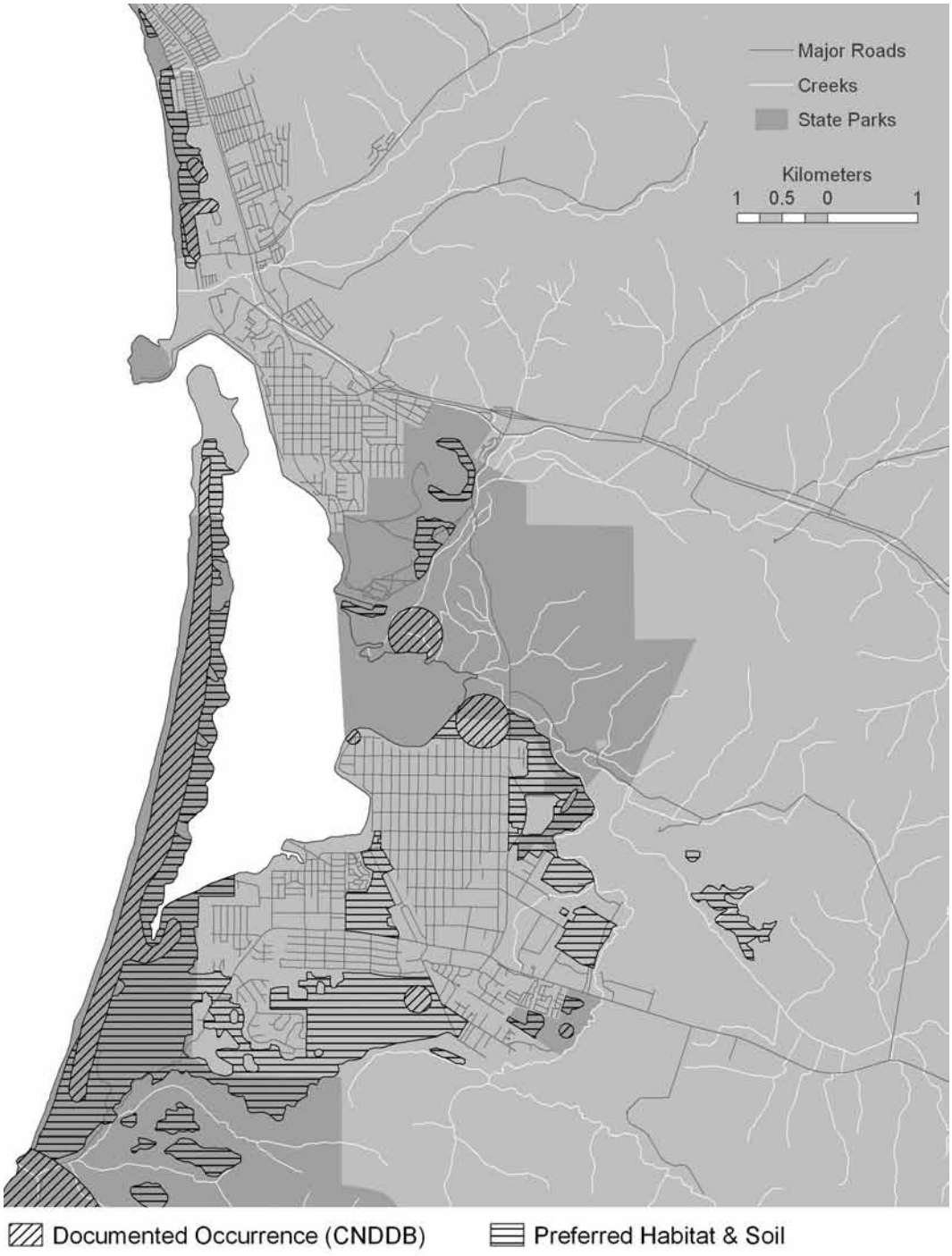
Maximum size difference between *H. walkeriana* from Montaña de Oro State Park (left) and *H. morroensis* from Camp San Luis Obispo (right). Source: August 2003 Cover of: Bulletin of the Southern California Academy of Sciences, 102(2):96-98 (Used With Permission).

Sensitive Status

Federal: Endangered, January 17, 1995.
State: G1/S1; Endemic Special Status Invertebrate.
Other: IUCN Critically Endangered.

Breeding Period: Rainy season.
Habitat: Coastal dune scrub, coastal scrub, and maritime chaparral communities that are mostly in back dune and stabilized dune systems with Baywood fine sands. Typically under native shrubs that provide thick leaf litter and canopy shelter.
Nesting: Prefer moist substrate with thick leaf litter and canopy shelter. *Egg Mass Size:* Unknown.
Range: Known only from northern Morro Bay south to Montaña de Oro State Park of San Luis Obispo County, California.
Identification: Moderately large snails, approximately 18 to 28 mm in diameter and 15 to 25 mm in height (D 0.7 to 1.1 in, H 0.6 to 1 in), with globose (globe shaped), helicoid shells and brown bodies. Their shells are slightly translucent, with spiral grooves and a narrow, dark-brown spiral band on the shoulder. *Helminthoglypta walkeriana* shells also have transverse and spiral striae (longitudinal ridges), which give it a "checkerboard" appearance. Another diagnostic characteristic is the presence of raised papillae (bumps) at the intersections of some of the striae. Morro Shoulderband Snails are similar to Big Sur Shoulderband Snails, however the latter tends to be flatter, shinier, and rarely has spiral striae. Big Sur Shoulderbands also have malleations (dents) and tend to be darker in color. Until recently *H. morroensis* was considered a subspecies of *H. walkeriana*, but has now been revealed as a separate species. *Helminthoglypta walkeriana* have a smaller range than *H. morroensis*, and are typically larger, more globose, and more tightly coiled than *H. morroensis* (see above photo). *Helminthoglypta walkeriana* also has more whorls and less papillation than *H. morroensis*.
Life History: Not much is known about the daily activities and behavior of this species. They are thought to eat fungal mycelium that grows on decaying plant matter. Their distribution appears to be highly clumped, with shells absent from areas with seemingly suitable vegetation. Based on similar species, *H. walkeriana* may live for 6-10 years, reaching maturity sometime between the third and fourth year.
Status in Morro Bay area: Occurs from northern Morro Bay south to Montaña de Oro State Park, and inland to Los Osos Creek in eastern Los Osos. In 2002, specimens were discovered at Morro Strand State Beach (MSSB) from Highway 41 north to the boardwalk, and perhaps another 100 meters north of the boardwalk. Also found on city dune property to the south of MSSB, and inland properties at "The Cloisters" housing tract and around Morro Bay High School (CDPR staff).
Threats: Populations are stable to increasing, and it is currently being recommended for downlisting from endangered to threatened by the United States Fish and Wildlife Service. A lot of previously considered threats (i.e. competition, parasitism, predation, over-collection) have been eliminated or shown to not be occurring. Possibly threatened in the town of Los Osos due to poisoning of garden snails, however there are no studies to show this is occurring. In the past several Morro shoulderband snails were killed as a result of controlled burning, but State Parks now conducts snail surveys prior to any prescribed fire management. The two largest remaining threats are development and lack of habitat management. Stochastic (i.e. random) events are also a threat due to their small number and isolation of remaining populations. Increased development around State Parks will likely increase threats from stochastic events, and additionally cause invasion of more exotic plants and animals that may further put populations at risk.

DISTRIBUTION *of* MORRO SHOULDERBAND SNAIL (*Helminthoglypta walkeriana*)



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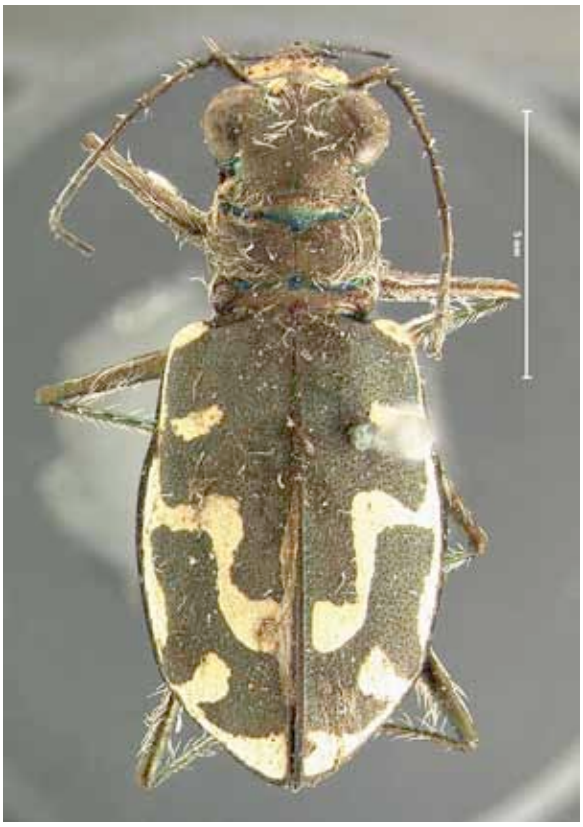
SANDY BEACH TIGER BEETLE
Cicindela hirticollis gravida


Adult *Cicindela hirticollis gravida*. Source: Museum of Comparative Zoology, Harvard University 2006 (Used With Permission).

Sensitive Status

Federal: None.

State: G5T2/S1; Endemic Special Status Invertebrate.

Other: Essig Museum of Entomology proposed for listing under Endangered Species Act.

Breeding Period: Eggs typically laid in late June or early July.

Habitat: Occur in moist sand near ocean, such as dunes, foredune swales, and upper beaches beyond normal high tides.

Nesting: Females are specific in choosing oviposition sites, laying eggs in soil, then covering them up, or on substrate in which the larva will burrow. *Larvae:* Third instar overwinters and opens burrow in May to feed. Pupation occurs June or July.

Range: Occurs throughout western United States and Canada. Along immediate coast of California from Point Reyes near San Francisco, south into northern Mexico, with historical records in Humboldt, San Francisco, San Mateo, Santa Cruz, Orange, and Los Angeles Counties. Currently known from coastal Marin, San Luis Obispo, Ventura, Santa Barbara, and San Diego Counties.

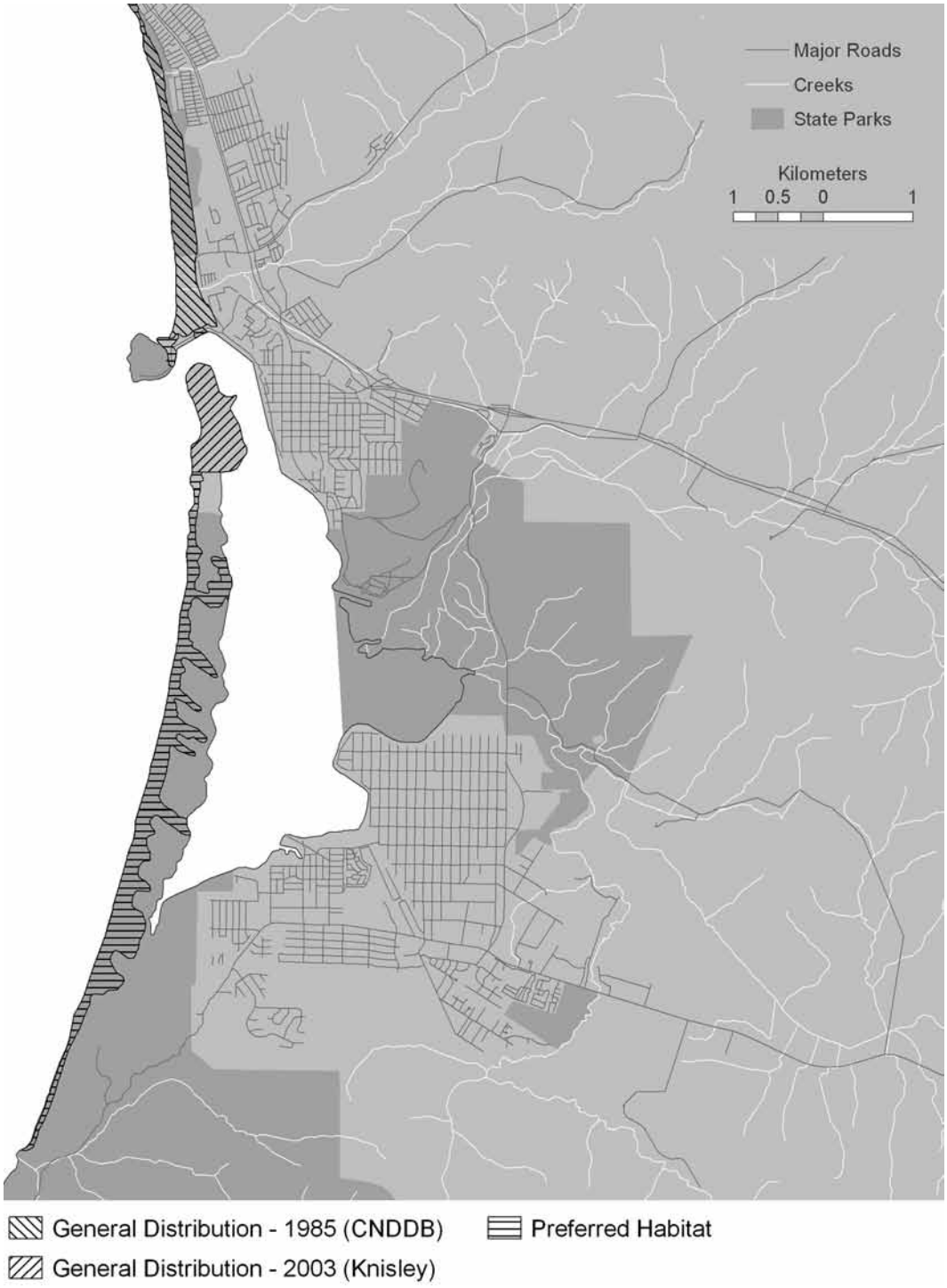
Identification: Generally brown to red-brown above and about 10 to 15 mm (0.4 to 0.6 in) long. Have a large tuft of long white hairs along the side of thorax and the front markings are roughly shaped like the letter "G", with a forward hook on the bottom end. In general, tiger beetles have large, prominent compound eyes and eleven segmented, filiform antennae. The tarsi are five-segmented, shiny, flattened, and with ridged wing covers. Larvae are "S" shaped and similar in appearance to caterpillars.

Life History: Tiger beetles are capable of sustained speeds of 40 kph (25 mph) in short bursts, making them the fastest land insects known. Adult tiger beetles remain inactive on cloudy, cool days, and burrow rather deep to prepare for winter diapause. Adults eat a wide range of insects, and larvae will eat most things they can get into their burrows. Unlike most tiger beetles, the larvae of *Cicindela hirticollis* relocate their burrows and are often observed crawling on the surface of sand. They will abandon old burrows and dig new ones in response to slight changes in soil moisture, which may be caused by disturbance. During movement, larvae are more prone to mortality from desiccation and diurnal predators. Larvae enlarge the diameter and depth of their burrow with each of three successive instars, producing holes as deep as 2 meters (6.6 feet) by the time it has reached its final instar in some species.

Status in Morro Bay area: An unknown number of Sandy Beach Tiger Beetles were collected on Morro Strand State Beach (MSSB) south in September of 1985 (CNDDB 2009). In 2003, Dr. Knisley surveyed MSSB with no results, however discovered a good population of *C. h. gravida* along the northern sandspit of Montaña de Oro State Park, with about 150 adults and larva (Knisley pers. comm. 2010). Future surveys are needed to determine existing presence and additional populations.

Threats: Possible threats include pollution, pesticides, river damming, channelization, shoreline development, exotic plants, heavy recreational use of shore areas, and other human-caused modifications of its habitat. Due to its unusually frequent larval movement in response to desiccation and immersion, this species is likely threatened by trampling on beaches throughout the Morro Bay area.

DISTRIBUTION *of* SANDY BEACH TIGER BEETLE (*Cicindela hirticollis gravida*)



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GLOBOSE DUNE BEETLE
Coelus globosus

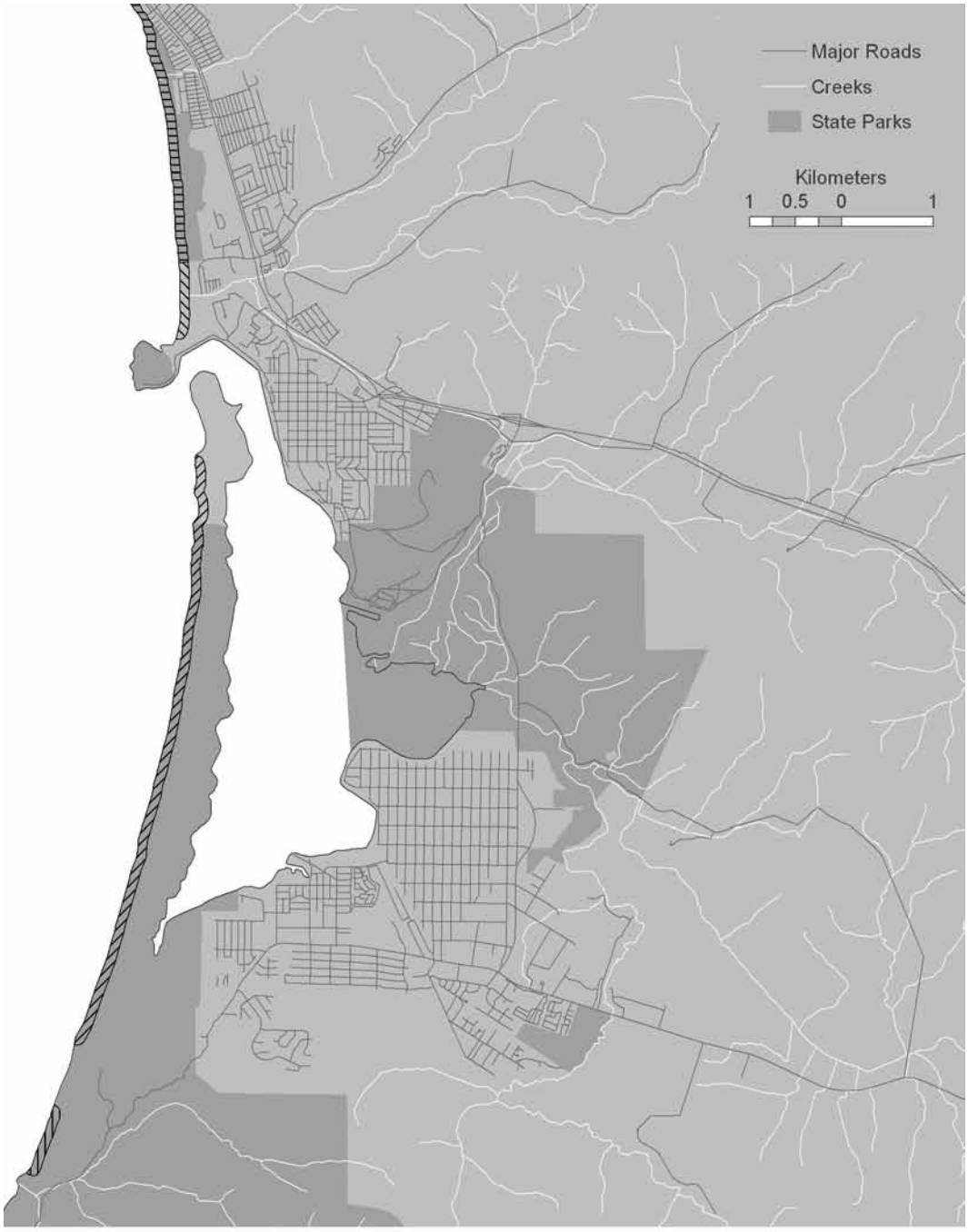
Sensitive Status

Federal: Species of Concern.
State: G1/S1; Endemic Special Status Invertebrate.
Other: Essig Museum of Entomology proposed for listing under Endangered Species Act; IUCN Vulnerable.

Dorsal view of *Coelus globosus*. Source: MCZ © 2006 The President and Fellows of Harvard College (Used With Permission).

Breeding Period: Unknown.
Habitat: Inhabit foredunes and sand hummocks within 50 m of the high tide line. Burrow beneath cover of various coastal dune plants, including beach bur (*Ambrosia chamissonis*), sand verbena (*Abronia* spp.), and beach saltbush (*Atriplex leucophylla*).
Nesting: Typically 5 to 10 cm (2 to 4 in) under surface of sand, beneath a canopy of vegetation. *Clutch Size:* Lay eggs singly or in masses, take several days to hatch.
Range: From Bodega Bay Head to Ensenada, Baja California, and all Channel Islands except San Clemente Island.
Identification: A small, 5 to 7 mm (0.2 to 0.3 in), round, flightless beetle. The first segment of the front tarsi is flat, similar in appearance to a spatula, and extends beyond the second segment. This species should not be confused with the similar Ciliated Dune Beetle (*Coelus ciliatus*), which is usually found more inland throughout the area. For identification between the two species please see Doyen 1976.
Life History: Little is known about the feeding habits of Globose Dune Beetles, although they are likely detrivores, feeding on decomposing vegetation buried in the sand. Adults may burrow out into open sand at night or during cool foggy days as seen by their shallow furrows left behind. *Coelus* larvae develop and pupate in the sand and are likely foraged upon by ant lions, Therevid fly larvae, as well as some mammals and invertebrates. For survey purposes, adult individuals may be found by following their tracks to the base of strand vegetation and excavating the sand to about 10 cm (4 in).
Status in Morro Bay area: Limited occurrences were documented along portions of Morro Strand State Beach (MSSB) in the 1980's by consultants as part of permitting for "The Cloisters" housing tract (Arnold 1992), and in 1982 a specimen was collected 4.8 road km (3 miles) north of Point Buchon in Montaña de Oro State Park (CNDDB 2009). In 2001, Dr. Richard Arnold documented occurrences just south of MSSB, and also mapped several individuals immediately south of the mouth of Morro Creek in conjunction with power plant permitting work. In 2005, extensive surveys were conducted every 30 meters (100 feet) by California Department of Parks and Recreation staff. Surveys resulted in specimens found along the sandspit of Montaña de Oro State Park and Villa Creek foredunes (Estero Bluffs State Property, outside of area of focus for this project), however none were discovered along the entire strand of MSSB. Due to the occurrence of *Coelus globosus* both north and south of MSSB, it is odd that none were discovered on the MSSB property, and further investigation is needed.
Threats: Habitat alteration or destruction is the most significant threat to this species. Recreational activities, sand mining, urbanization, and encroachment by non-native plants are major contributing factors to their decline. In the Morro Bay area they may be threatened by ice plant (*Carpobrotus* spp.) and European beach grass (*Ammophila arenaria*), along with potentially destructive recreational use of beaches.

DISTRIBUTION *of* GLOBOSE DUNE BEETLE (*Coelus globosus*)



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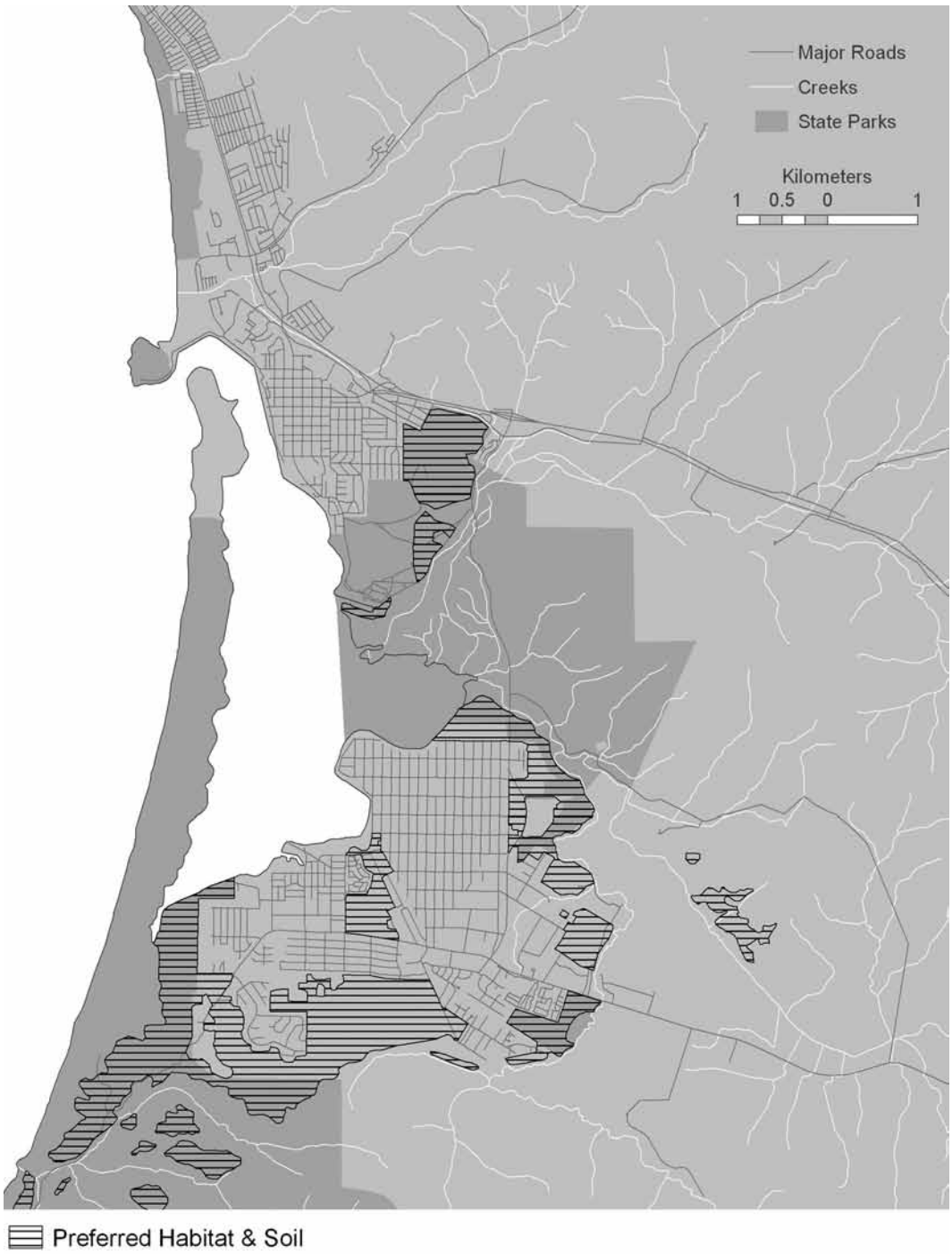
MORRO 10-LINED JUNE BEETLE
Polyphylla species novae *'morroensis'*

Sensitive Status
Federal: None.
State: None.
Other: Newly discovered endemic.

Dorsal view of *Polyphylla* species novae *'morroensis'*.
Source: © 2009 Lisa Andreano (Used With Permission).

Breeding Period: Unknown.
Habitat: Restricted to Baywood fine sands of coastal scrub, maritime chaparral, and oak woodland communities near coast.
Nesting: In general, eggs are laid in or near a suitable substrate, including compost, dung, or leaf litter beneath the adult's food plant. *Clutch Size:* Usually 6-10, pearly white round eggs.
Range: Only known to occur in Los Osos of San Luis Obispo County, California.
Identification: A large beetle, 18 to possibly 30 mm (0.7 to 1.2 in) with longitudinal stripes of off white and large antennal clubs. Similar to other *Polyphylla* species, but smaller in size, darker, and with thinner longitudinal white stripes. In general, their head is distinct and darker than the rest of the body. They have a pair of four-segmented antenna, simple eyes, and four-segmented legs. Their abdomen is ten segmented and has no projections. Larvae are C-shaped and referred to as white grubs due to their white to cream color.
Life History: A newly discovered species! The last sighting of a similar *Polyphylla* species was in the 1970's and it was later presumed extinct by local experts. It has recently been re-discovered in Los Osos as a result of State Park resource inventories. Based on sand associations of other 10-lined June beetles, this species is restricted to Baywood fine sands. The behavior and biology of most California scarab beetles is relatively unknown. In general, scarab beetles feed on compost, dung, detritus, or roots. Larvae molt twice before constructing a chamber and transforming into a pupa, and most species overwinter as larvae or adults. Many 10-lined June beetles are attracted to street and porch lights at night, and therefore may be found in urban areas outside of preferred habitat from time to time.
Status in Morro Bay area: Endemic to Baywood fine sands of Los Osos, California. Occurs at Cuesta By the Sea, Los Osos Oaks Reserve, Morro Bay State Park land surrounding Los Osos Middle School, and possibly Sharks Inlet of Montaña de Oro State Park (M. Walgren 2010, pers. comm., 18 Feb.).
Threats: Specific threats to the Morro 10-lined June Beetle are unknown. It is possibly threatened by loss or alteration of habitat and may be susceptible to random naturally occurring events due to the likelihood of low numbers of individuals and populations. Further studies are needed to determine the status of this newly re-discovered, seemingly rare coastal endemic.

DISTRIBUTION *of* MORRO 10-LINED JUNE BEETLE (*Polyphylla* species novae *'morroensis'*)



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'MORRO' BOISDUVAL'S BLUE
Plebejus icarioides 'moroensis'

Sensitive Status

Federal: Species of Concern (delisted).
State: G5T1T3/S1S3; Endemic Special Status Invertebrate.
Other: Essig Museum of Entomology proposed for listing under Endangered Species Act.

Dorsal view of female 'Morro' Boisduval's Blue. Source: © 2006 *The Butterflies of the Estero Bay Area*, Walgren et al.

Ventral view of female 'Morro' Boisduval's Blue. Source: © 2006 *The Butterflies of the Estero Bay Area*, Walgren et al.

Flight Period: March to July.
Habitat: Coastal silver lupine (*Lupinus chamissonis*) is the obligate host plant for this species. Occurs in coastal dune scrub and coastal scrub containing *Lupinus chamissonis* and other native shrubs.
Nesting: Eggs are laid singly on new leaves or flowers of host plant. *Clutch Size:* Unknown. Similar species lay 8 to 80 eggs on average.
Range: Along immediate coast of San Luis Obispo and Santa Barbara Counties. This variety is restricted to dunes at Vandenberg Air Force Base, Pismo and Guadalupe Dunes, and dunes of Morro Bay.
Identification: A relatively small, 2.9 to 3.5 cm (1.1 to 1.4 in) wingspan, delicate butterfly. Upperside of male is lilac-blue with dark borders, and females are brown to blue with dark borders. Undersides of wings have black or white post-median spots that are larger on the forewing than on hindwing. These butterflies, as with many blues, consist of metapopulations of which certain local populations may become very isolated and disappear. Following this pattern, the 'Morro' Boisduval's Blue is genetically distinct from other populations; and as a whole, Morro blues from Pismo, Vandenberg, and Morro Bay are distinct from inland populations.
Life History: The North American Butterfly Association does not recognize this subspecies. The subfamily Polyommatinae in which this species resides was long used to assign taxa of unclear relationships, and is in much need of revision. As a result, *Plebejus icarioides* has been classified in at least four different genera since originally named. Starting in the genus *Lycaena*, it was transferred to *Icaricia*, then moved to *Aricia*, and is now merged with some other genera into the supergenus *Plebejus*. Caterpillars feed on *Lupinus chamissonis*, eating the leaves at first, then flowers and seedpods. After eating, caterpillars in their second instar enter diapause (a dormant state) in the litter at the base of their host plant. They emerge from diapause and resume feeding in the following spring. Third and fourth instar caterpillars produce a well-developed sugary secretion that is eaten by ants, which in turn protect them.
Status in Morro Bay area: Locally common March to July in dune habitat containing *Lupinus chamissonis* throughout the Morro Bay area, including dunes of Morro Strand State Beach and Montaña de Oro State Park. Also documented in coastal scrub of southeast Morro Bay State Park near Los Osos Middle School (Powell State Properties), at two locations on private property of Los Osos, and open land around Los Osos Library and Palisades Ave. (CDPR staff).
Threats: Due to the obligate nature of this species with *Lupinus chamissonis*, anything that threatens *L. chamissonis* also threatens the 'Morro' Boisduval's Blue. Loss, fragmentation, and/or degradation of habitat are major threats; and invasive plants, such as beach grass (*Ammophila arenaria*), ice plant (*Carpobrotus* spp.), and veldt grass (*Ehrharta calycina*) may replace native coastal dune plants in which this species requires.

DISTRIBUTION *of* 'MORRO' BOISDUVAL'S BLUE (*Plebejus icarioides 'moroensis'*)

Sources:
Bunn, D., A. Mummert, M. Hoshovsky, K. Gilardi, and S. Shanks. 2007. California Wildlife: Conservation Challenges, California's Wildlife Action Plan. California Department of Fish and Game, Sacramento. 597 pp.
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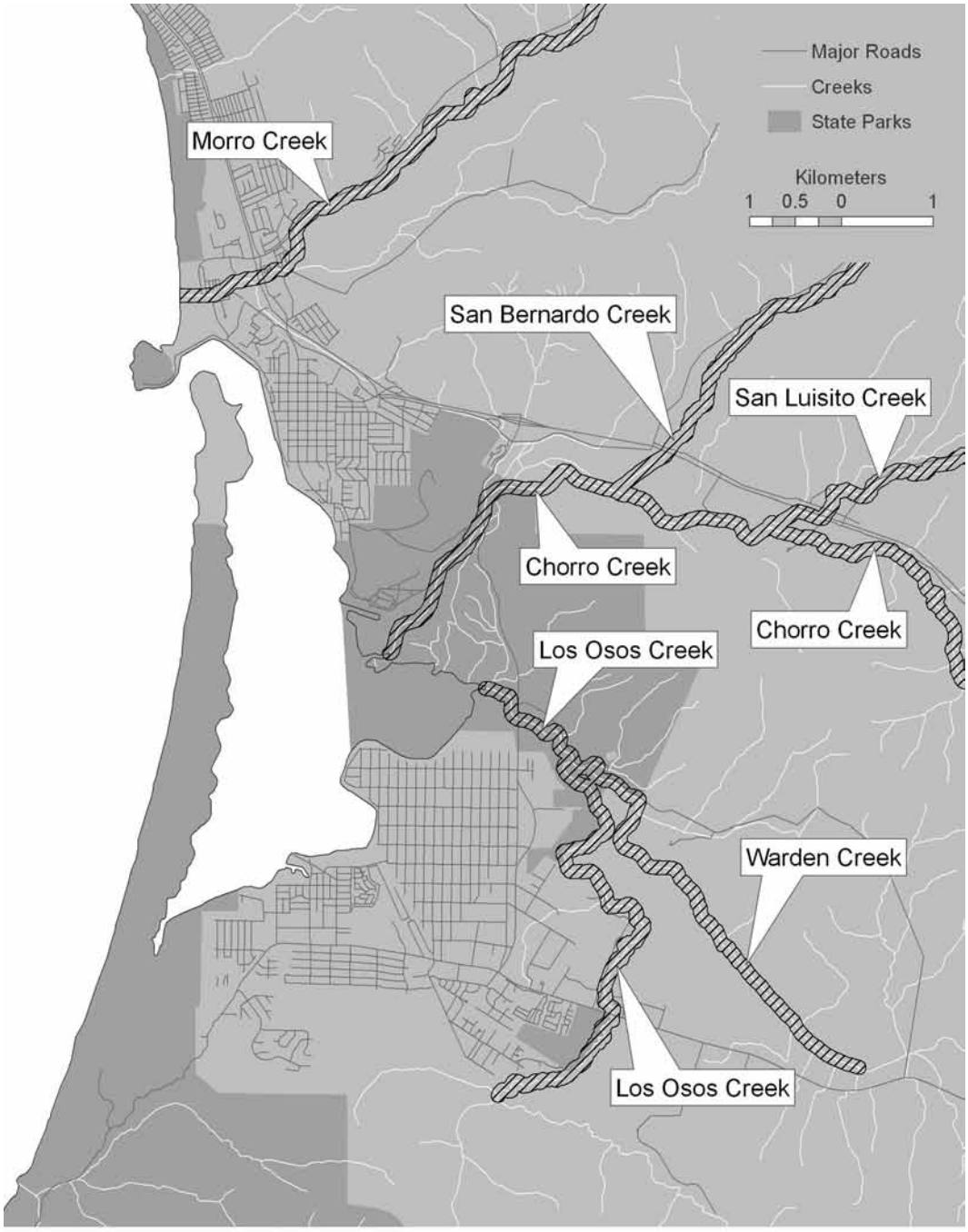
COASTAL RAINBOW TROUT
Oncorhynchus mykiss irideus


Coastal Rainbow Trout. Source: U.S. Fish and Wildlife Service.

Sensitive Status
Federal: Threatened, October 17, 1997.
State: G5T2Q/S2; Species of Special Concern.
Other: American Fisheries Society Endangered.

Breeding Period: December to April.
Habitat: Occur in emergent riparian and palustrine habitats. They prefer habitat with relatively good water quality and low suspended sediment and contamination loads. The optimal water temperature for migrating adults is from 7.8 to 11°C (46 to 52°F). Breeding occurs in freshwater streams and tributaries, typically with clear, cool to cold, fast flowing water with a high dissolved oxygen content.
Reproduction: Females construct spawning beds over gravel and cobble substrate in water depths of 15 to 60 cm (6 to 24 in) with optimal temperatures from 3.9 to 11°C (39 to 52°F). Eggs are laid in the beds by females then fertilized by males. *Clutch Size:* Between 200 and 12,000 eggs depending on size of female. Optimal water temperatures for incubation and emergence are from 8.9 to 11°C (48 to 52°F).
Range: The South/Central California Coast ESU contains populations from the Pajaro River in Monterey County south to (but not including) the Santa Maria River. The overall species is native to western North America and the Pacific Coast of Asia.
Identification: Coastal Rainbow Trout and resident rainbow trout cannot be distinguished in the field. They are elongate fish with two widely spaced dorsal fins. The second dorsal fin is fleshy and lacks rays. Adults are silver to dark with a faint red band down the sides, and may have dark spots on the dorsal surface of the tail. Juveniles have dark roundish ovals down their sides. They can be distinguished from salmon fry by the number of anal rays in the fins, with rainbow trout having 8 to 12 and salmon having 13 to 19.
Life History: The local populations of steelhead along the Central Coast are in the South/Central California Coast Evolutionary Significant Unit (ESU). ESU's are reproductively isolated and have distinct genetic, life history, and ecological traits, but are not different enough from other units to be considered subspecies. Steelheads are anadromous rainbow trout. Adults return to freshwater to breed and unlike salmon, do not usually die following breeding. Coastal Rainbow Trout are predators with a varied diet, feeding on nearly everything that drifts by them. Juveniles have the highest temperature tolerance, preferring temperatures from 7.2 to 15.5°C (45 to 60°F), and travel to the ocean where they remain for 1 to 4 years.
Status in Morro Bay area: Known from up to 12 km (7.5 miles) upstream in Morro Creek, up to 5.6 km (3.5 miles) upstream in San Luisito Creek, from mouth of Chorro Creek to Chorro Reservoir, in San Bernardo Creek to about 120 meters (400 feet) in elevation, and in Coon and Islay Creeks of Montaña de Oro State Park (CNDDB 2009, CDPR Staff). Coastal Rainbow Trout have also been documented in Warden Creek, and as far upland to at least the Los Osos Oaks Reserve in Los Osos Creek (CDPR Staff).
Threats: South/Central California Coast ESU Steelhead populations have declined from a number of factors including disturbance, habitat loss, overharvest, and effects of hatchery practices. The primary considerations of decline are direct loss and/or modification of aquatic and riparian habitat, and changes in water quality and quantity. There is still a considerable need for research to accurately determine populations throughout California and to identify the factors that limit their numbers.

DISTRIBUTION *of* COASTAL RAINBOW TROUT (*Oncorhynchus mykiss irideus*)



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TIDEWATER GOBY
Eucyclogobius newberryi


Tidewater Goby side view. Source: Greg Goldsmith, U.S. Fish and Wildlife Service.

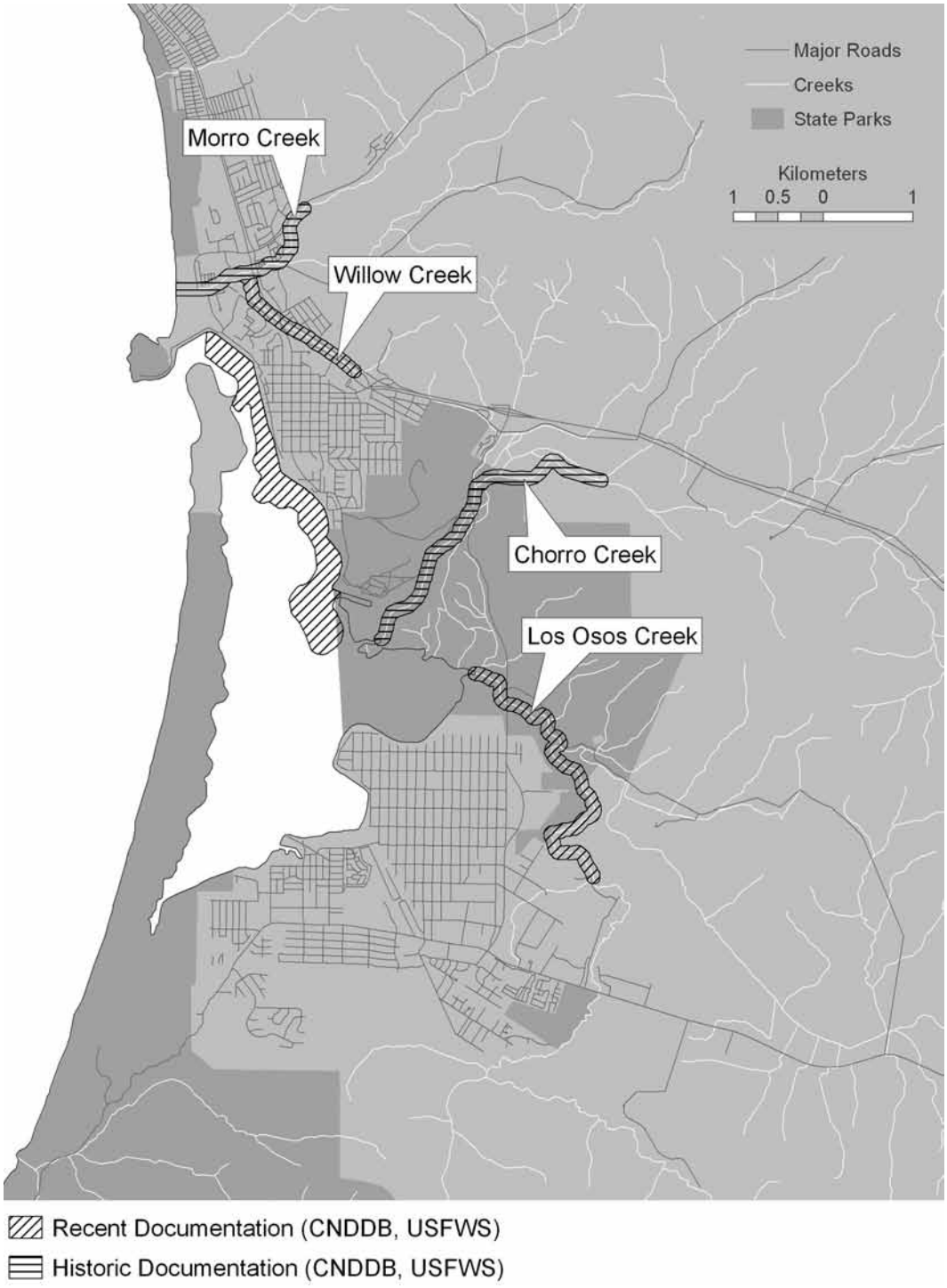

Tidewater Goby dorsal view. Source: Greg Goldsmith, U.S. Fish and Wildlife Service.

Sensitive Status

Federal: Endangered, February 4, 1994.
State: G3/S2S3; Species of Special Concern; Endemic Special Status Vertebrate.
Other: American Fisheries Society Endangered; IUCN Vulnerable.

Breeding Period: Throughout the year, with peak activity from March to July.
Habitat: Occur in estuaries, lagoons, and marshes of small coastal streams that typically have slow or sluggish-moving water. Inhabit a variety of substrates from sand, rock, mud, and/or silt, residing in areas up to 8 km (5 miles) upstream from lagoons. Usually found in water less than one meter (3.3 feet) deep with salinities less than 12 parts per thousand (ppt), but can also occur in waters up to 2 meters (6.6 feet) deep with salinities ranging from 0 to 42 ppt.
Reproduction: Breed in areas of sandy substrate with temperatures ranging from 6.7 to 25°C (44 to 77°F), and salinities from 2 to 27 ppt. Males dig breeding burrows in relatively unconsolidated, clean, coarse sand in lagoons close to the ocean. *Clutch Size:* Typically 300 to 500 eggs per clutch, depending on the size of female, with 6 to 12 clutches a year.
Range: Occurs only in California, from the Agua Hedionda Lagoon of San Diego County in the south, to the mouth of the Smith River of Del Norte County in the north. It is known historically from about 124 locations, but has been extirpated from at least 28 of these sites.
Identification: The Tidewater Goby is an elongated fish, rarely exceeding 5 cm (2 in) in length, with eyes oriented high on the head and very small scales that are partially embedded in the skin. They have two dorsal fins along with large pectoral fins, and their anterior dorsal fin has a transparent portion on its upper edge. A similar species that occurs in the same habitat is the native Arrow Goby (*Clevelandia ios*), which can be distinguished from *Eucyclogobius newberryi* by its more slender body.
Life History: Tidewater Gobies are bottom-dwelling and rest on substrate or cling to the sides of rocks using their pelvic fins, which resemble suction cups. They feed on mysid shrimp, amphipods, ostracods, and aquatic insects. Although not known to inhabit marine environments, they are thought to disperse short distances in the ocean. Breeding can occur year-round, and females aggressively spar for access to males with burrows for laying their eggs. Individuals usually live for only one year.
Status in Morro Bay area: Documented in Los Osos Creek of Morro Bay State Park from 2001 surveys, and in Morro Bay Main Channel from nearly 200 samples collected in the summer of 1999 (CNDDB 2009). They also occur in Willow Creek, and are historically known in Morro Creek from 1916 (USFWS 2006), and in Chorro Creek from 1984 (CNDDB 2009).
Threats: The Tidewater Goby is mostly threatened by modification and loss of habitat due to coastal development, channelization, and alteration of water flows. Potential threats include agricultural and sewage runoff, increased sedimentation due to cattle grazing and feral pig activity, summer breaching of lagoons, and off-road vehicle use in the vicinity of habitat. The introduction of exotic gobies (e.g. Yellowfin and Shimofuri Gobies) and Rainwater Killfish (*Lucina parva*) also pose a threat to this species. In Morro Bay, the Tidewater Goby may be threatened by nonylphenol ethoxylate contamination from wastewater runoff, which has caused primordial gonadal and liver tumors in about ten percent of 150 Arrow Gobies (*Clevelandia ios*) sampled from the area.

DISTRIBUTION *of* TIDEWATER GOBY (*Eucyclogobius newberryi*)



Sources:

Bunn, D., A. Mummert, M. Hoshovsky, K. Gilardi, and S. Shanks. 2007. California Wildlife: Conservation Challenges, California's Wildlife Action Plan. California Department of Fish and Game, Sacramento. 597 pp.

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CALIFORNIA RED-LEGGED FROG
Rana aurora draytonii

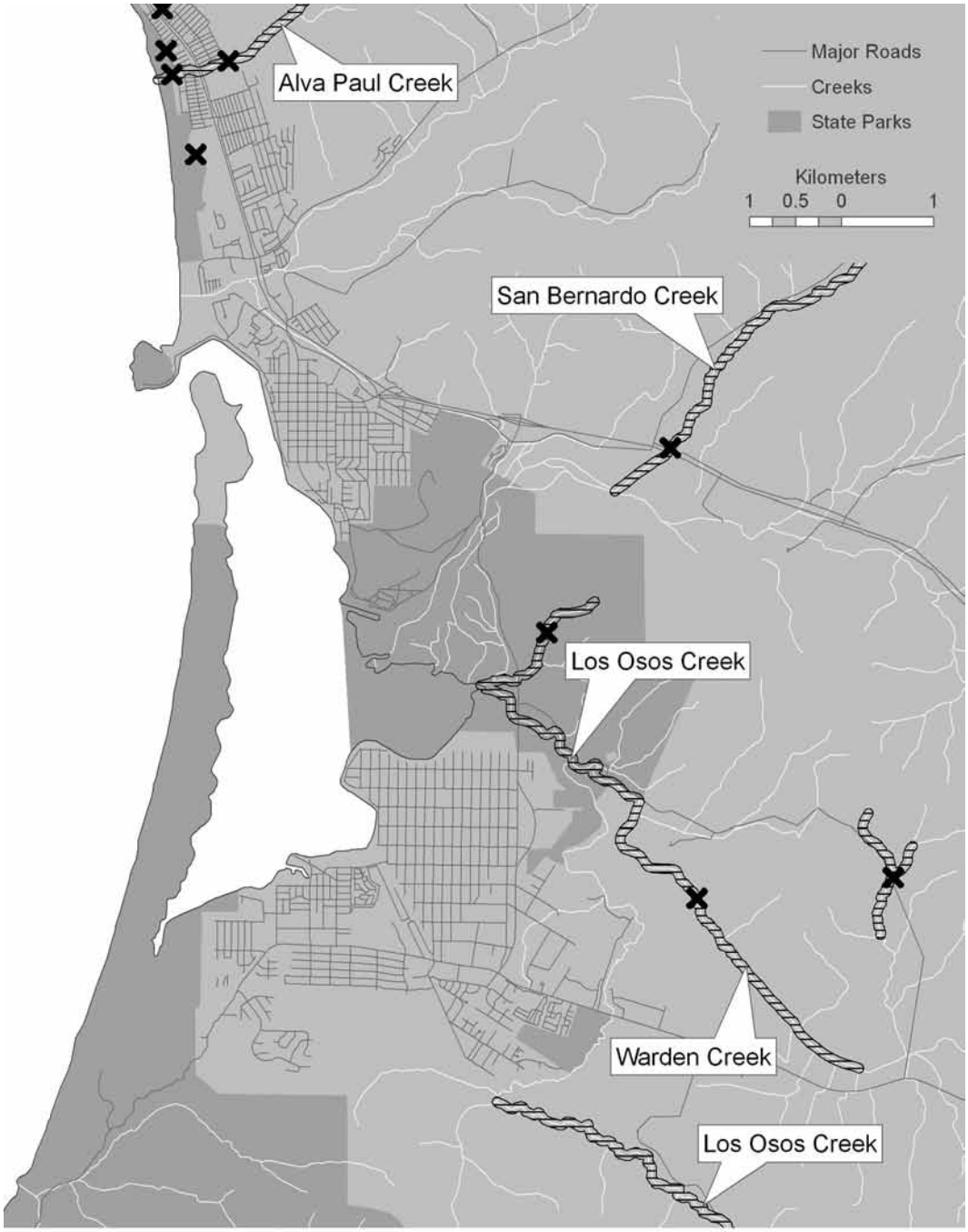

California Red-legged Frog adult. Source: California Department of Parks and Recreation.


California Red-legged Frog tadpole. Source: California Department of Parks and Recreation.

Sensitive Status
Federal: Threatened, May 23, 1996.
State: G4T2T3/S2S3; Species of Special Concern.
Other: IUCN Vulnerable.

Breeding Period: November to April.
Habitat: Occur in a wide variety of habits that usually retain water through mid-summer; including streams, springs, ponds, marshes, sloughs, lakes, reservoirs, riparian corridors, grasslands, and oak savannas. May occur under cover objects or in small burrows and recesses in banks during winter.
Reproduction: Breed in shallow, 25 to 50 cm (10 to 20 in) deep, vegetated margins of ponds or stream pools. *Clutch Size:* Usually 2,000 to 5,000 eggs laid in loose, oval, floating clusters about the size of a grapefruit.
Range: Coast Ranges of California from Marin to Ventura Counties, with a few isolated localities in Sierra Nevada, San Joaquin Valley, and southern California. Historically found throughout Central Valley, western slope of Sierra Nevada from Shasta to Tulare Counties, and coastal southern California.
Identification: *Adults and juveniles:* Dorsal surface of hind legs has dark bands and ventral surface is red to salmon colored. A pair of dorsolateral folds running from the eyes to the sides of the back distinguishes this species from other frogs in our region. Metamorphs may lack red on undersides of legs, and have very large gold eyes and bright pinkish dorsolateral folds. *Larvae*: Eyes are within outline of body and mostly upward-oriented. Tadpoles greater than 20 mm (0.8 in) in total length have a network of pores running down the length of the body, forming an elaborate pattern across the head. The dorsal surface has irregularly shaped dark mottling with light flecks, while the ventral surface is iridescent pink or gold, and intestines may be seen.
Life History: All stages are active mainly at night, but individuals are regularly seen during the day. Metamorphs disperse to upland areas in July through February, where they apparently remain over winter. Larvae usually metamorphose after three and a half to seven months, and are mainly benthic, preferring vegetated margins. The diet of adults includes fish, aquatic and terrestrial insects, tadpoles, and small frogs. Frogs may forage in upland habitat and have been recorded to move in one season between aquatic sites that were up to 2.8 km (1.7 miles) apart, but in many cases individuals remain within 50 meters (164 feet) of water. They can occupy upland areas for as long as 60 consecutive days, therefore habitat connectivity and protection of upland habitat surrounding wetlands is important.
Status in Morro Bay area: Locally common to small ponds and creeks throughout the area. Documented at two locations in Alva Paul Creek and three other areas in northern Morro Bay from 2000 to 2005; Documented in San Bernardo Creek along Highway 1 in 1998 and 2000, upper Los Osos Creek in 2003, a tributary to Los Osos Creek that crosses Turri Road in 2006, Warden Creek at west end of Warden Lake in 2008, and an unnamed drainage crossing South Bay Blvd. from Morro Bay State Park between Los Osos and Chorro Creeks in 2000 (CDPR staff, CNDDB 2009).
Threats: Threatened in the area by development, vegetation clearing, modifications to surface and subsurface hydrology, ice plant (*Carpobrotus chilensis* and *C. edulis*) and other invasive plant encroachment, grazing, and predation by feral cats and exotic Bullfrogs (*Rana catesbiana*).

DISTRIBUTION *of* CALIFORNIA RED-LEGGED FROG (*Rana aurora draytonii*)



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SOUTHWESTERN POND TURTLE
Actinemys marmorata pallida

Sensitive Status

Federal: USDA Forest Service Sensitive Species.

State: G3G4T2T3Q/S2; Species of Special Concern.

Other: Bureau of Land Management Sensitive Species; IUCN Vulnerable.

Adult female Southwestern Pond Turtle in Tortuga Creek of San Simeon, California.

Basking adult female Southwestern Pond Turtle in Tortuga Creek of San Simeon, California.

Breeding Period: April to August.

Habitat: Occur in a Variety of habitats containing aquatic vegetation and slow moving water; including ponds, lagoons, marshes, rivers, streams, and ditches. Substrate is varied and surrounding vegetation is often woodland and grassland. Require exposed areas for sun basking.

Nesting: Females lay and bury eggs on land in clay or silt substrate with low moisture, usually on un-shaded slopes. Most nest sites are within 50 meters (164 feet) of waters edge, but some have been recorded as far as 400 meters (1,300 feet) away. *Clutch Size:* Usually 4 to 7 (2 to 13) off-white eggs that are elliptical to oval in shape, with up to two clutches per season.

Range: Historically distributed in most drainages west of the Sierra Nevada from south of San Francisco Bay to Baja California, Mexico.

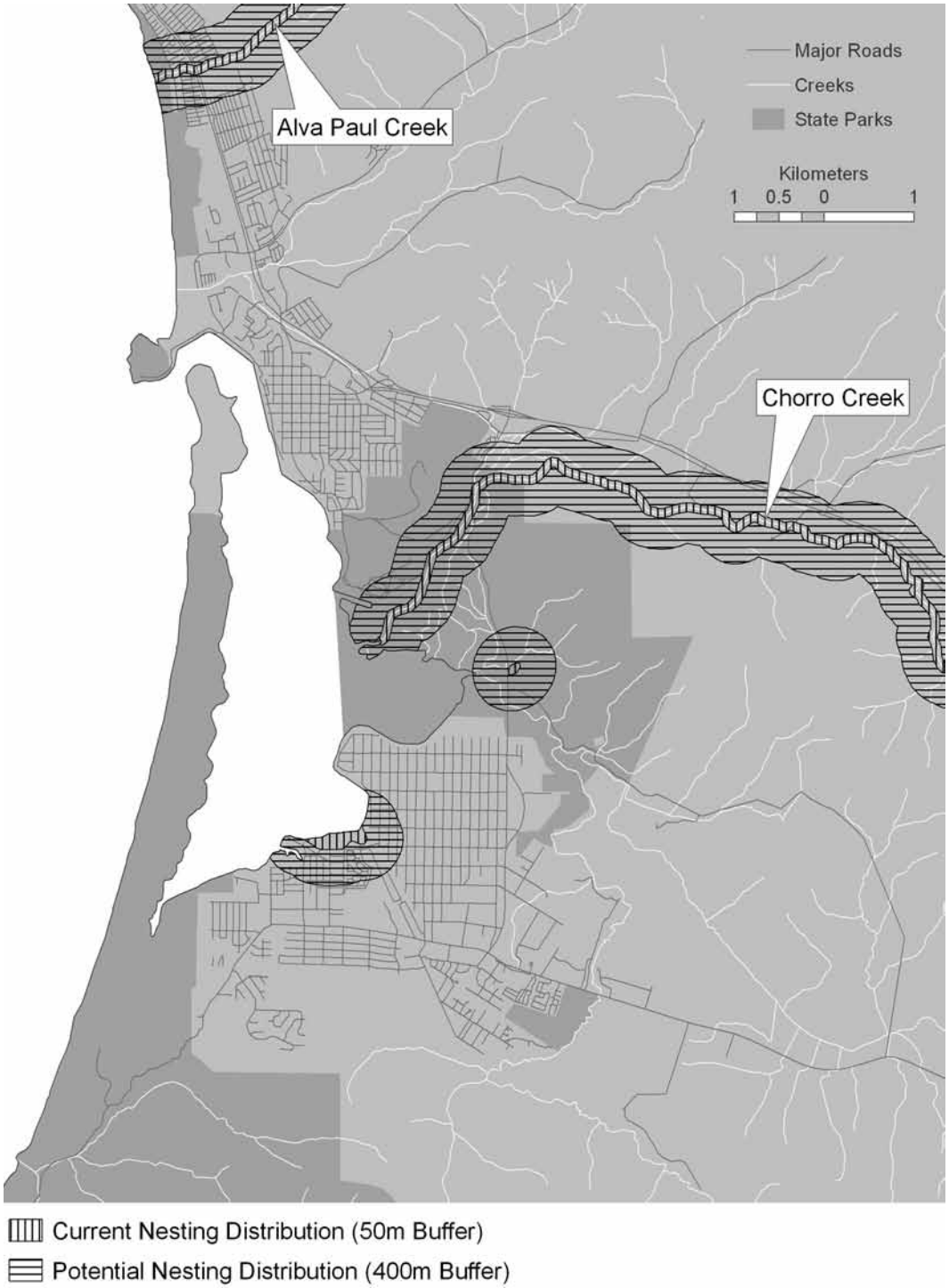
Identification: Adult carapaces are 12 to 21 cm (4.7 to 8.2 in) in length, are not highly domed, and are drab olive to brown in color, often with dark marks radiating from the center of each shield. Males have a concave plastron, longer tails, and a light unmottled throat, whereas the female plastron is flat and the throat is mottled. Can be distinguished from introduced Red-eared Sliders by lacking red, orange or yellow coloration on the head. Hatchlings have tails almost as long as their carapace, which is around 25 mm (0.8 in) in length; and their head, limbs, and tail may have dusky yellow markings.

Life History: On the Central Coast, Southwestern Pond Turtles may be active year-round or may aestivate during winter in upland habitat. Adults forage in water for plants, detritus, carrion, invertebrates, and fish, while hatchlings and juveniles eat zooplankton. They are active out of the water only during the day, and can navigate steep and slippery terrain. At night they can be seen swimming or floating with their head above water. Females can produce two clutches per season, and most *A. marmorata* hatchlings overwinter in nest, migrating to aquatic sites the following spring or fall. Adults can be long-lived (greater than 50 years), losing the appearance of individual scute rings as they age.

Status in Morro Bay area: Currently year-round in Alva Paul Creek of Morro Strand State Beach, Chorro Creek in Morro Bay State Park, and at Sweet Springs Nature Preserve in Los Osos (recent sightings by CDPR staff). Also recorded in a small ditch located approximately 1 km (0.62 mi) north of Santa Ysabel Ave. along the east side of South Bay Blvd. (ENDD 1996).

Threats: In the 19th and early 20th centuries, tens of thousands of *Actinemys marmorata* were collected and exploited for food, and in the 1960's hundreds were collected for the pet trade. Today, habitat destruction and alteration is the greatest threat to this species. Other threats include urban-related predation pressures (i.e. dogs, skunks, and raccoons), competition with non-native turtles, pollution, grazing, and off-road vehicle and recreation use. They are very susceptible to disturbance during overland nesting movements, and may abandon their nest and return to water if bothered.

DISTRIBUTION *of* SOUTHWESTERN POND TURTLE (*Actinemys marmorata pallida*)



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CALIFORNIA HORNED LIZARD
Phrynosoma coronatum frontale

Sensitive Status
Federal: None.
State: G4G5/S3S4; Species of Special Concern.
Other: Bureau of Land Management Sensitive Species; IUCN Least Concern; CITES II.


California Horned Lizard displaying concealed coloration in coastal scrub of Montaña de Oro State Park.


California Horned Lizard after squirting blood from the eyes as a natural defense mechanism.

Breeding Period: April to June.
Habitat: Occur in a variety of habitats; including scrubland, chamisal chaparral, sand dunes, grassland, coniferous forests, and riparian woodlands from sea level to about 2,000 meters (6,500 feet) in elevation. They require loose soil (sand, sandy-loam, alkali flats, or gravel) for burrowing, and open areas for basking in the sun.
Nesting: Appears to require fine, loose soils where it can readily bury itself. *Clutch Size:* Usually 6 to 21 eggs.
Range: Along California's coast from southern San Francisco Bay area to northern Los Angeles County, east to the foothills of the Sierra Nevada and Cascade Mountains. Historically known from scattered localities throughout Shasta County, the Central Valley, and San Francisco Bay area.
Identification: Horned lizards have flattened oval shaped bodies, 65 to 105 mm (2.6 to 4.1 in) snout to vent length) and horns around the head. They have two rows of pointed scales on each side of the body and 2 to 3 rows of scales on each side of the throat. Dorsal color is sandy reddish-brown to gray or tan, usually resembling the background soil color. Ventral surface is yellow to white with distinct dark spots, and they have darker horizontal bars and a lighter dorsal stripe.
Life History: Horned lizards often remain motionless, blending in with their background. They feed almost exclusively on native ant species, but will also forage on termites, beetles, wasps, flies, and grasshoppers. Though they look somewhat menacing with their horns and spines, they are generally very docile, timid lizards when approached and handled by humans. Their defensive behavior involves flattening the body, stiffening the legs, and opening the mouth and hissing, along with rocking or jumping toward the threat. If further provoked they may squirt blood from the eyes up to 61 to 91 cm (2 to 3 feet) as seen in the above photo, in an attempt to distract predators as they make their escape.
Status in Morro Bay area: California Horned Lizard's are occasional to the southern sandspit near Shark's Inlet to the sandspit trail area of Montaña de Oro State Park. Individuals were documented along the southeast edge of Los Osos in 2002 (CNDDB 2009), along Morro Strand State Beach south in 2001, along the sandspit trail of Montaña de Oro State Park from 2005 to present, and in the Morro Bay State Park land surrounding Los Osos Middle School from 2005 to present (CDPR staff).
Threats: Primary threats include the ongoing fragmentation and loss of preferred habitat. It has disappeared from approximately 35% of its historic range in northern and central California, with remaining populations becoming increasingly fragmented. Other threats include increased human presence in rural areas, increased use of pesticides, which reduces available food supply, and occurrence of domestic cats and other non-native predators. Also, the introduction and spread of the less palatable Argentine Ant is displacing native ant species upon which this lizard normally feeds. In 2001, a Red Fox was observed trying to eat an individual at Morro Strand State Beach south. The lizard was found caught in plastic landscaping mesh and was removed by CDPR staff before predation occurred.

DISTRIBUTION *of* CALIFORNIA HORNED LIZARD (*Phrynosoma coronatum frontale*)

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SILVERY LEGLESS LIZARD
Anniella pulchra pulchra

Sensitive Status

Federal: UDSA Forest Service Sensitive Species.
State: G3G4T3T4Q/S3; Species of Special Concern; Endemic Special Status Vertebrate.
Other: IUCN Least Concern.


Adult Silvery Legless Lizard from Morro Bay, California. Source: Gary Nafis (Used With Permission).


Adult Silvery Legless Lizard from Morro Bay, California. Source: Gary Nafis (Used With Permission).

Breeding Period: Peak period from March to July.
Habitat: Primarily in areas with sandy or loose loamy soils, under sparse vegetation of beaches, coastal scrub, chaparral, oak woodland, desert scrub, and riparian habitats. Has been associated with bush lupines (*Lupinus arboreus*), mock heather (*Ericameria ericoides*), and coastal buckwheat (*Eriogonum parvifolium*). Can also be found under boards, logs, and in woodrat (*Neotoma* spp.) nests.
Nesting: Require moist, sandy loose soil. *Clutch Size:* Females usually bear 2 (1 to 4) live young.
Range: South of San Francisco Bay along coast to Baja California and east to the Central Valley. Occurring in the Tehachapi, Piute and Scodie Mountains and scattered desert slope drainages. Present sea level to 1,524 meters (5,000 feet).
Identification: The Silvery Legless Lizard is 11.1 to 17.8 cm (4.4 to 7 in) long, and has a shiny polished appearance with metallic silver, gray, beige, or jet black above and pale yellow-white to bright yellow below; sometimes with dark blotches. Their tail is heavily pigmented and faintly lined or unmarked, and they have a dark vertebral line with several dark lateral lines that decrease in number as individuals age.
Life History: The morphology of Silvery Legless Lizards is specialized for their fossorial existence, and since usually underground they can be very abundant in an area but seldom seen. Most active in the morning and evening, occurring just under the ground surface in sunny areas and infrequently on the soil surface during warm nights. On the coast they may be active almost year-round. They forage in loose-leaf litter by ambushing their prey, which includes small moths, beetles, termites and spiders.
Status in Morro Bay area: Locally common to Los Osos. Individuals are reported in backyards of local residents regularly, though formal reports are rarely made. In 2005, they were documented at Morro Bay State Park surrounding Los Osos Middle School and in the backyard of a Los Osos residence (CNDDB 2009). Populations have been documented along southern portions of the sandspit in the past, and at Shark's Inlet of Montaña de Oro in 2002 (Walgren pers. comm.). The three individuals of *Anniella pulchra nigra* found north of Islay Creek in 1984 (CNDDB 2009) were likely misidentified species of *Anniella pulchra pulchra* due to the type locality and color variation of this species.
Threats: Legless lizards likely cannot survive in urbanized, agricultural, or other areas where loose soil substrate has been removed, and it is estimated that at least 20% of their known historic range is now gone. Other threats include livestock grazing, recreational vehicle use, sand mining, beach erosion, the introduction of household pets (especially feral cats), and invasive plants. Areas that contain ice plant (*Carpobrotus* spp.), beach grass (*Ammophila arenaria*), veldt grass (*Ehrharta calycina*), eucalyptus trees (*Eucalyptus* ssp.), and other invasive plants have reduced soil moisture or altered substrate conformation, which inhibits the Silvery Legless Lizard from living there. Ice plant (*Carpobrotus* spp.) also builds up salt concentration within the soil, which may create unsuitable habitat. Due to their insectivorous diet, pesticide use is another factor that may reduce legless lizard populations.

DISTRIBUTION *of* SILVERY LEGLESS LIZARD (*Anniella pulchra pulchra*)

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BRANT
Branta bernicla

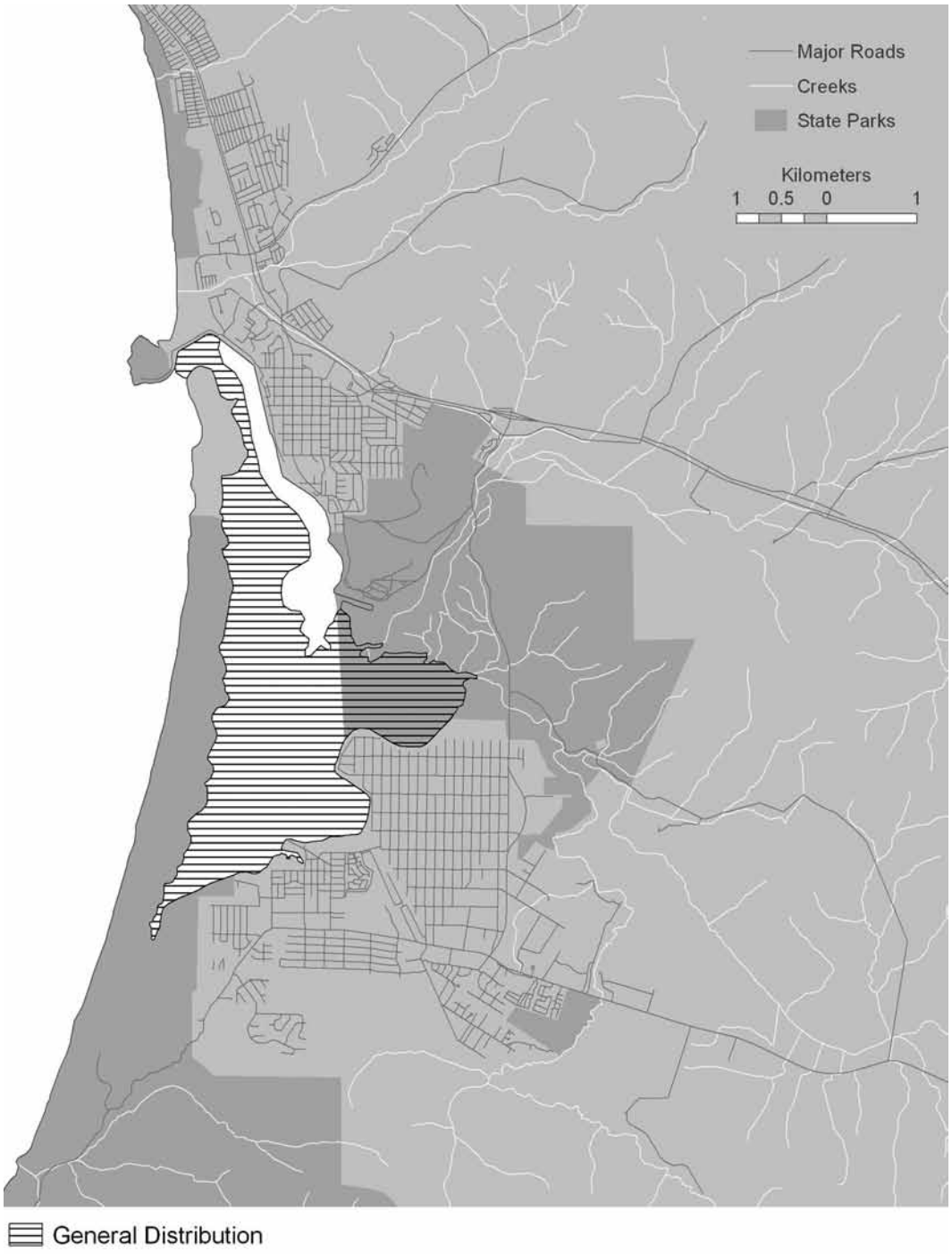

Brant adult. Source: Robert Harrington, 2007 (Used With Permission).


Brant adults with chicks. Source: Jeff Wasley, U.S. Geological Survey.

Sensitive Status
Federal: Partners in Flight WatchList; Migratory Bird Treaty Act.
State: G5/SNR; Species of Special Concern.
Other: IUCN Least Concern.

Breeding Period: May to September.
Habitat: Occur throughout salt bays, estuaries, marshes; typically concentrating in large coastal bays with eelgrass (*Zostera* spp.). On wet coastal tundra while in Arctic regions, and along coastlines with mild climates in winter. Occasionally occur on freshwater lakes in interior regions during migration.
Nesting: Nest on small islands in tundra pools, along slight rise in low grassy flats, usually within 1.6 to 8 km (1 to 5 miles) of coast. Create a shallow bowl of grass and other materials and heavily line with down. *Clutch Size:* Usually 3 to 5 (8) creamy white to pale olive eggs that become nest stained.
Range: Breed in the Arctic, with several subspecies breeding across the high latitudes of the Northern Hemisphere. Winter throughout Atlantic and Pacific Coasts.
Identification: A medium to small goose, 56 to 66 cm (22 to 26 in), that is deep brown in color overall, and has a black head, neck, and breast. They have a dark bill and wings, and extensive white uppertail coverts. Adults have a variable broken white collar with barred gray-and-white sides. Juveniles are similar to adults, but lack collar and have white scaling on their back.
Life History: Brants nest further north than all other geese, and may fly at altitudes of several thousands of feet. They feed in flocks throughout most of the year, foraging mostly on plant material. During migration and winter they feed mostly on aquatic plants, green algae, and others. On breeding grounds they mostly eat sedges, grasses, pondweeds, and others. Also eat some aquatic insects, worms, and mollusks. Forage by walking on tidal flats or on shore, or by wading in shallow water. Adult pairs often form bond on wintering grounds and breed in loose colonies during summer. Females incubate eggs and will cover eggs with down to keep them warm while leaving the nest to feed. Young leave nest within 1 to 2 days after hatching and are led to feeding grounds by both parents. During long daylight hours of the high Arctic, young feed themselves at all hours and develop quickly, fledging at 40 to 50 days.
Status in Morro Bay area: Brants are common winter visitors to the area, with peak numbers occurring between late November and mid-March. Numbers sharply decline through April; and a small number of birds often remain into June, with only a few occasionally remaining through summer. Occur throughout interior regions of the Morro Bay Estuary, and in spring this species is often found feeding on eelgrass (*Zostera* spp.) at Coleman Park (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Because Brants rely heavily on eelgrass; they are highly vulnerable to fluctuations in quality of this habitat type. Humans negatively affect eelgrass habitat in numerous ways, including petroleum storage and transport, salt production, dredging and filling, mariculture, coastal and upstream development, siltation from logging, grazing, pollution, and introduction of exotic species. In healthy eelgrass habitats, Brants may become displaced by human disturbances from boats, aircrafts, loud noises, and recreational activities. Disturbances at Morro Bay are thought to be much higher than that of Humboldt Bay; even after area specific closures and hunting regulations have been set in place.

DISTRIBUTION *of* BRANT (*Branta bernicla*)



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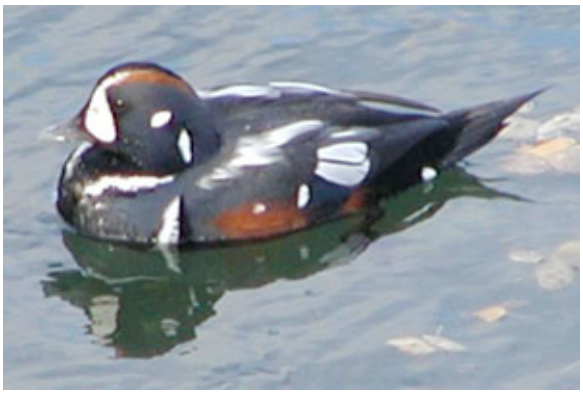
HARLEQUIN DUCK
Histrionicus histrionicus

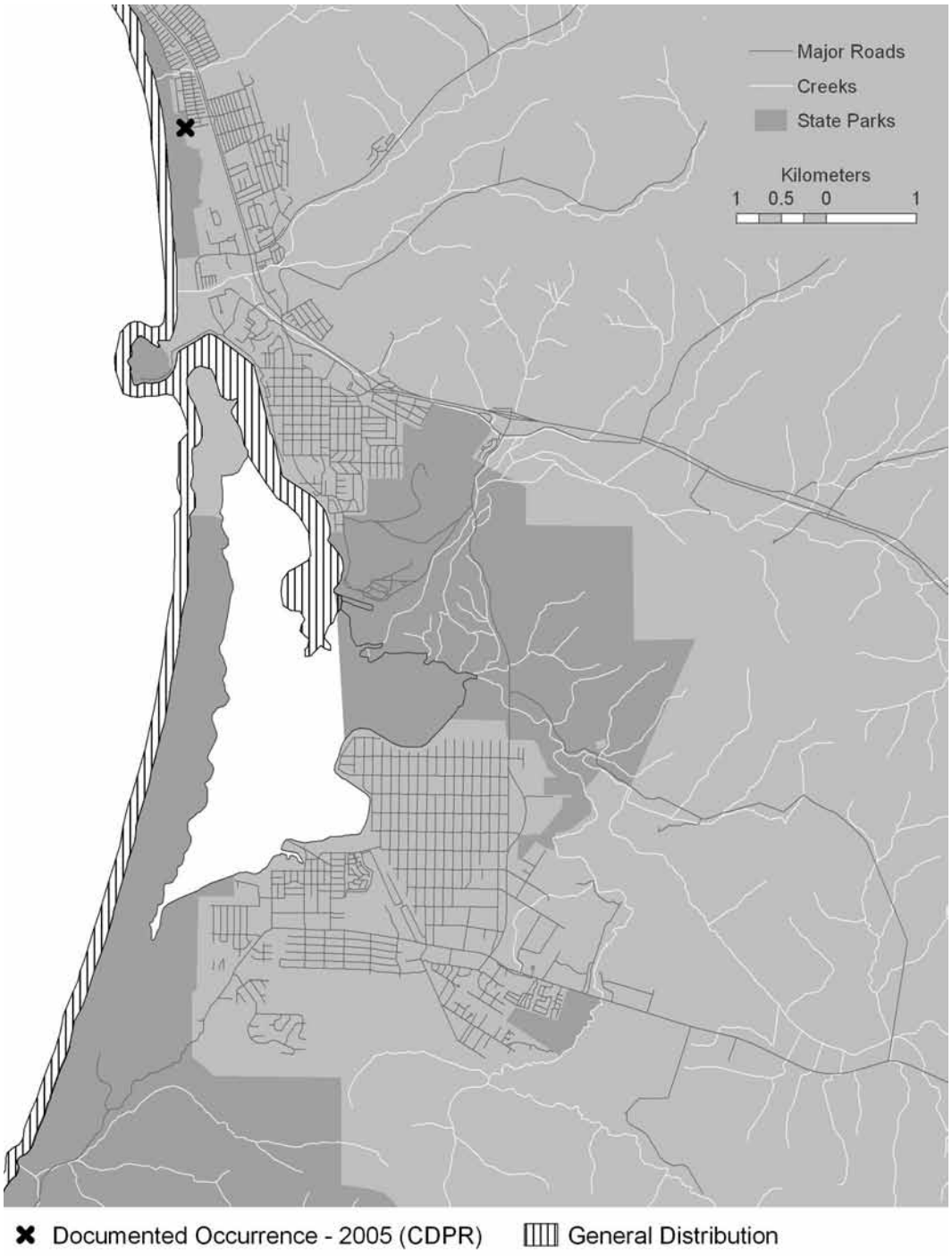

Breeding adult Harlequin Duck. Source: U.S. National Park Service.

Sensitive Status

Federal: Species of Concern; Migratory Bird Treaty Act.
State: G4/S2; Species of Special Concern.
Other: Bureau of Land Management Sensitive Species; IUCN Least Concern.

Breeding Period: April to September.
Habitat: Occurs in shallow, fast-flowing mountain streams during the breeding season, and along rocky inshore coastal waters and estuaries during the non-breeding season. Rarely occur on freshwater lakes during migration.
Nesting: Nest site is on ground usually close to water and is well hidden among rocks or under bushes. In the Pacific Northwest, they also rarely nest in tree cavities. The nest is built by the female and consists of a shallow depression with grasses, twigs, and weeds, lined with down. *Clutch Size:* Usually 5 to 7 (3 to 10) pale buff or cream-colored eggs.
Range: Occur throughout Northwest and eastern North America. Winters along the coast, and formerly bred in the Sierra Nevada. Some non-breeders remain on the coast year-round.
Identification: A medium sized, 33 to 54 cm (13 to 21.3 in), diving duck that is rather drab in the non-breeding season. It is mostly deep brown with a high forehead, small bill, and white mark on the side of the head. In the breeding season this bird is intricately marked with black and white stripes alternating the body, and with red on the top of its head and on the sides of its body.
Life History: Harlequin Ducks feed mostly on mollusks, crustaceans, and insects. They forage by swimming underwater or by diving and walking on the bottom, using their bill to pry food off of rocks. Females carry out incubation and care of young, and broods will often combine under the care of multiple adult females.
Status in Morro Bay area: A rare winter visitor from October to March that occurs casually in summer (T. Edell 2009, pers. comm., 22 Nov.). A summering male was documented in the area in 2008 and 2009 (Slocobirding 2010). Also documented at Morro Strand State Beach south in 2005 at the Azure Street parking lot (Walgren et al. 2005).
Threats: Wintering populations in eastern North America are currently much smaller than historical numbers, but have grown in the past few decades. The disappearance of Harlequin Ducks from most of their historic breeding range in the Sierra Nevada is likely due to past trapping and shooting by fisherman. Hydraulic mining, logging, and reservoirs have also removed or degraded extensive areas of suitable nesting habitat in the Sierra Nevada. Disturbance of nesting birds by rafters, hikers, fisherman, and other recreational activities on large rivers along the west slope of the Sierra Nevada can reduce reproductive success and may preclude recolonization of otherwise suitable habitats.

DISTRIBUTION *of* HARLEQUIN DUCK (*Histrionicus histrionicus*)



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COMMON LOON
Gavia immer


Adult Common Loon. Source: U.S. Forest Service.

Sensitive Status
Federal: Migratory Bird Treaty Act.
State: G5/S1; Species of Special Concern.
Other: IUCN Least Concern.

Breeding Period: April to August.
Habitat: Occur in open water, wintering in estuaries and coastal marine areas near shore. In summer it occurs mainly on large lakes, reservoirs, and rivers.
Nesting: Nest is built by both male and female on floating islands or shoreline, sometimes on top of muskrat mounds. It consists of a large wet mass of plant material and is partly hidden by surrounding vegetation. *Clutch Size:* Usually 2 (1) olive egg with brown or black spots.
Range: Breeds across Alaska and Canada to northern United States and Yellowstone region. Also in Greenland, Iceland, and occasionally Scotland. Winters from Alaska to southern Mexico, and Newfoundland to eastern Mexico. Also winters in Europe from Iceland to the Mediterranean.
Identification: A large waterbird, 66 to 91 cm (26 to 35.8 in), that is rather plainly colored in the non-breeding season. It has a two-toned bill that is gray with a black tip, and a thick neck and white ring around the eye. Their neck has a partial white color below the bill and their back has jagged black and white markings. This bird also shows an apparent "necklace" or bands of white stripes around its black neck.
Life History: Expert divers, loons have eyes that can focus both in air and under water and have nearly solid bones that make them heavier than many other birds. They are able to concentrate oxygen in their leg muscles to sustain them during the strenuous paddling that can take them as far as 60 meters (200 feet) below the water's surface. They primarily eat fish, but may also eat shellfish, frogs, and aquatic insects. First breeding occurs after 2 to 3 years of age. In courtship displays, pairs dip bills in water repeatedly, rear up to a vertical posture with wings partly spread, and race side by side across the surface of the water. Young leave the nest within 1 to 2 days after hatching and can dive and swim underwater at 2 to 3 days. Both parents tend to young and when small, young sometimes ride on their parent's backs. Adults may live for 20 to 30 years.
Status in Morro Bay area: Common in winter and uncommon in summer throughout open waters in and around the Morro Bay Estuary near shoreline. Most often found in from the harbor mouth, up bay to the Morro Bay Marina, and only in the main channels of the Morro Bay Estuary (T. Edell 2009, pers. comm., 22 Nov.).
Threats: The Common Loon has decreased in number along its southern range from the early to mid 20th century, and has disappeared entirely from some of its former nesting areas. Main threats include human disturbances on lakes (particularly in summer months), and poisoning by mercury and lead from fishing sinkers in aquatic ecosystems. Acid rain may also reduce food supplies in its breeding range. The North American Loon Fund, a non-profit conservation organization, sponsors research, management, and educational programs in an effort to protect and check the population decline of the Common Loon and other loon species of North America.

DISTRIBUTION *of* COMMON LOON (*Gavia immer*)

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AMERICAN WHITE PELICAN
Pelecanus erythrorhynchos

Sensitive Status
Federal: Migratory Bird Treaty Act.
State: G3/S1; Species of Special Concern.
Other: IUCN Least Concern.

Adult American White Pelican on nest, already in non-breeding plumage. Source: U.S. Fish and Wildlife Service.

American White Pelicans fishing. Source: Bruce Sizer, Wikimedia Commons.

Breeding Period: March to April.
Habitat: Occurs mostly inland during breeding season; in lakes, marshes, and salt bays. Winters mainly along coast, on shallow, protected bays and estuaries, as well as lakes in warmer climates.
Nesting: Nest site is on ground, usually on open bare soil, and occasionally among grasses or underneath trees. Nest is built by both male and female and consists of a shallow depression surrounded by a low rim of stones, dirt, and plant material. *Clutch Size:* Usually 2 dull white eggs that become nest-stained.
Range: Breeds in scattered locations from western Minnesota to northern California. Winters in California, Mexico, Florida, and along the Gulf Coast.
Identification: One of the largest birds in North America, with a wingspan of 275 cm (9 feet) and a massive yellow-orange bill. It is similar in shape to the California Brown Pelican, but much larger and with different habits. It has an orange throat patch and orange skin around the eyes, with extensive black in the wings, and a short white tail. Males and females look alike, and juveniles are similar to adults, but have dirty grayish markings on their head and back. Breeding individuals have a small keeled, upright plate that develops on the upper mandible, and a pale yellow crest on the back of the head.
Life History: The American White Pelican does not dive for fish as the California Brown Pelican does. Instead, it swims along the surface and dips its bill into water to scoop up fish in its pouch. Several pelicans may fish cooperatively, moving into a circle to line up fish and drive them toward shallower water. During the breeding season they often forage at night, locating fish by touch from frequently dipping bill. By day they likely locate prey visually.
Status in Morro Bay area: Common from July through mid-April, and rare to uncommon from mid-April to July within the Morro Bay Estuary. Rarely occurs along coastline or near shore outside of Morro Bay (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Colonies are vulnerable to disturbance and habitat loss. The total population declined during the first half of the 20th century, but has substantially increased from the 1970's. The extreme concentration of California's breeding population leaves them vulnerable to catastrophic losses. Although their colonies in California are remote (mostly in the Klamath Basin), they are still susceptible to human disturbances on a daily basis, ground predators during drought years, or rapid transmission of disease at any time.

DISTRIBUTION *of* AMERICAN WHITE PELICAN (*Pelecanus erythrorhynchos*)

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CALIFORNIA BROWN PELICAN
Pelecanus occidentalis californicus

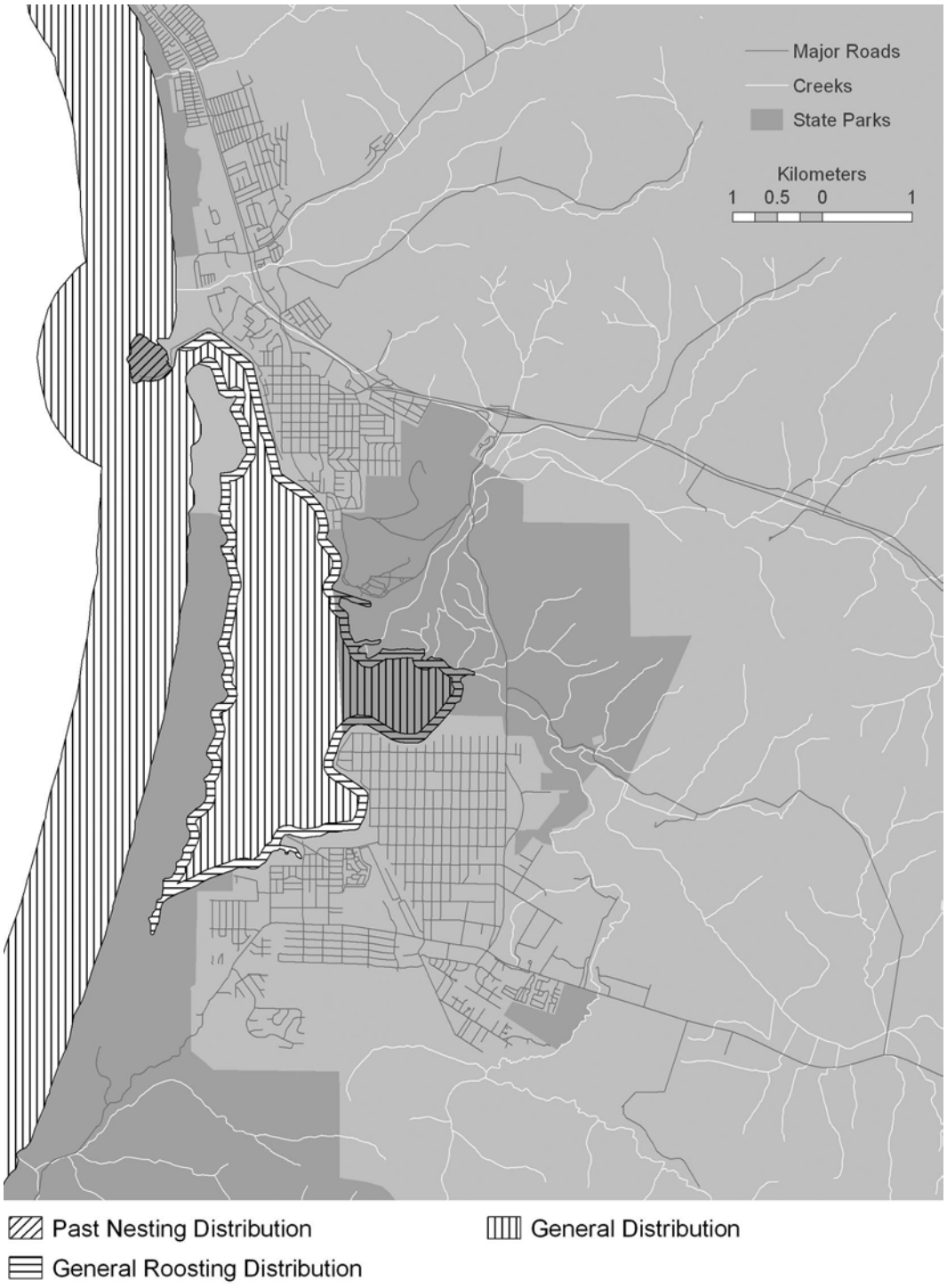

Adult California Brown Pelicans with non-breeding plumage.

Sensitive Status

Federal: Endangered, June 2, 1970; Proposed for delisting, February 20, 2008; Migratory Bird Treaty Act.
State: G4T3/S1S2; Endangered, June 27, 1971; Candidate for delisting, December 19, 2008; Fully Protected Species.
Other: IUCN Least Concern.

Breeding Period: March to April.
Habitat: Warm coastal marine and estuarine environments, along salt bays and beaches. Mostly over shallow waters, especially on sheltered bays.
Nesting: Breed and build nests in colonies on islands without mammal predators. Nests are made of sticks and built either on the ground or in bushes. Material is gathered by male and nest is built by female. *Clutch Size:* Average of 3 (2 to 4) chalky white eggs.
Range: Non-breeding Californian Brown Pelicans range from the Gulf of California to southern British Columbia. They nest on islands in the Gulf of California and along the coast to West Anacapa and Santa Barbara Islands. They are rarely seen inland and far out at sea.
Identification: The California Brown Pelicans is larger than other subspecies of brown pelicans, with adults weighing 2 to 5 kg (4.5 to 11 pounds), and a wingspan of over 2 meters (6.5 feet). Adults are grayish-brown with long, pouched bills, a white or yellowish head and dark body. Immature birds are dark with a white belly. They are larger than other subspecies of Brown Pelicans.
Life History: California Brown Pelicans have a very keen eye, allowing them to fly over the ocean and spot a school of small fish, or even a single fish without problem. They dive steeply into water from up to 18 meters (60 feet) in the air and come to the surface with fish in their bill. Air sacs beneath their skin cushion the impact and help them come to the surface. After surfacing they tilt their bill downward to drain water out of their pouch, then toss head back to swallow fish. In California they feed on sardines, mackerels and anchovies. All courtship happens at the nest site and both parents take turns sitting on eggs and feeding chicks. Adults have few predators, and sharks will occassionally attack when they dive.
Status in Morro Bay area: Common along the coast and in the Morro Bay Estuary from May through December. Previously nested on Morro Rock, and roost throughout the bay and along inside of sandspit of Montaña de Oro State Park (T. Edell 2009, pers. comm., 22 Nov.).
Threats: California Brown Pelicans are threatened by predation of their eggs from other birds, raccoons, cats, dogs, and other introduced species. Other threats include human disturbances, starvation events (from over-fishing and/or adverse weather and other factors), fishing hooks and lines, domoic acid poisoning (associated with certain harmful algal blooms), and oil spills. Changes in weather patterns and El Niño type weather events can also decrease chick mortality. During the 1960's and 70's California Brown Pelicans were fewer than 1,000 breeding pairs, and their productivity was nearly zero. The main cause of their decline was the use of the DDT pesticide, which was banned in 1972. In 2002, the population was estimated to have increased by 150,000 from the time they were placed on the endangered species list in 1970. The United States Fish and Wildlife Service now considers them recovered, and they were proposed for delisting on February 20, 2008.

DISTRIBUTION *of* CALIFORNIA BROWN PELICAN (*Pelecanus occidentalis californicus*)



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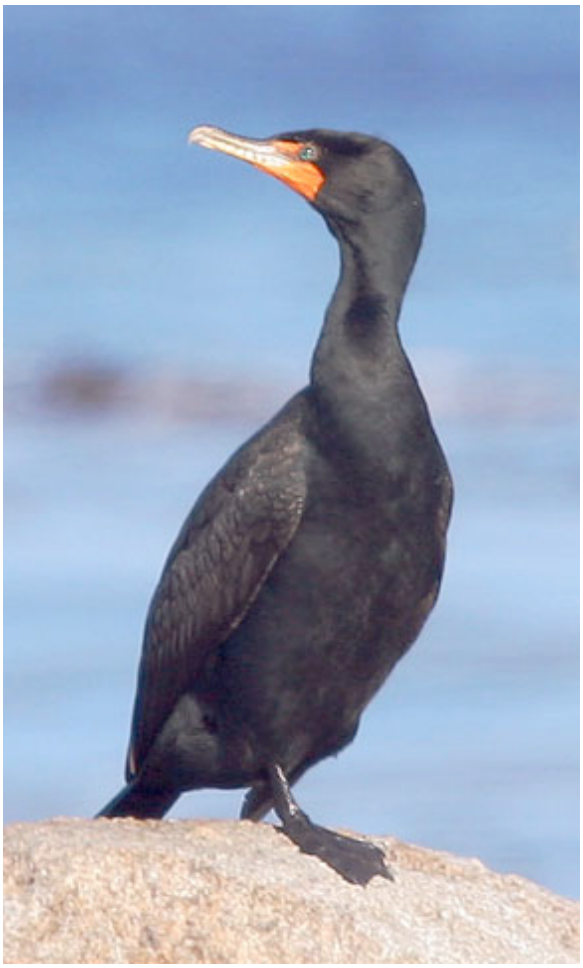
DOUBLE-CRESTED CORMORANT
Phalacrocorax auritus

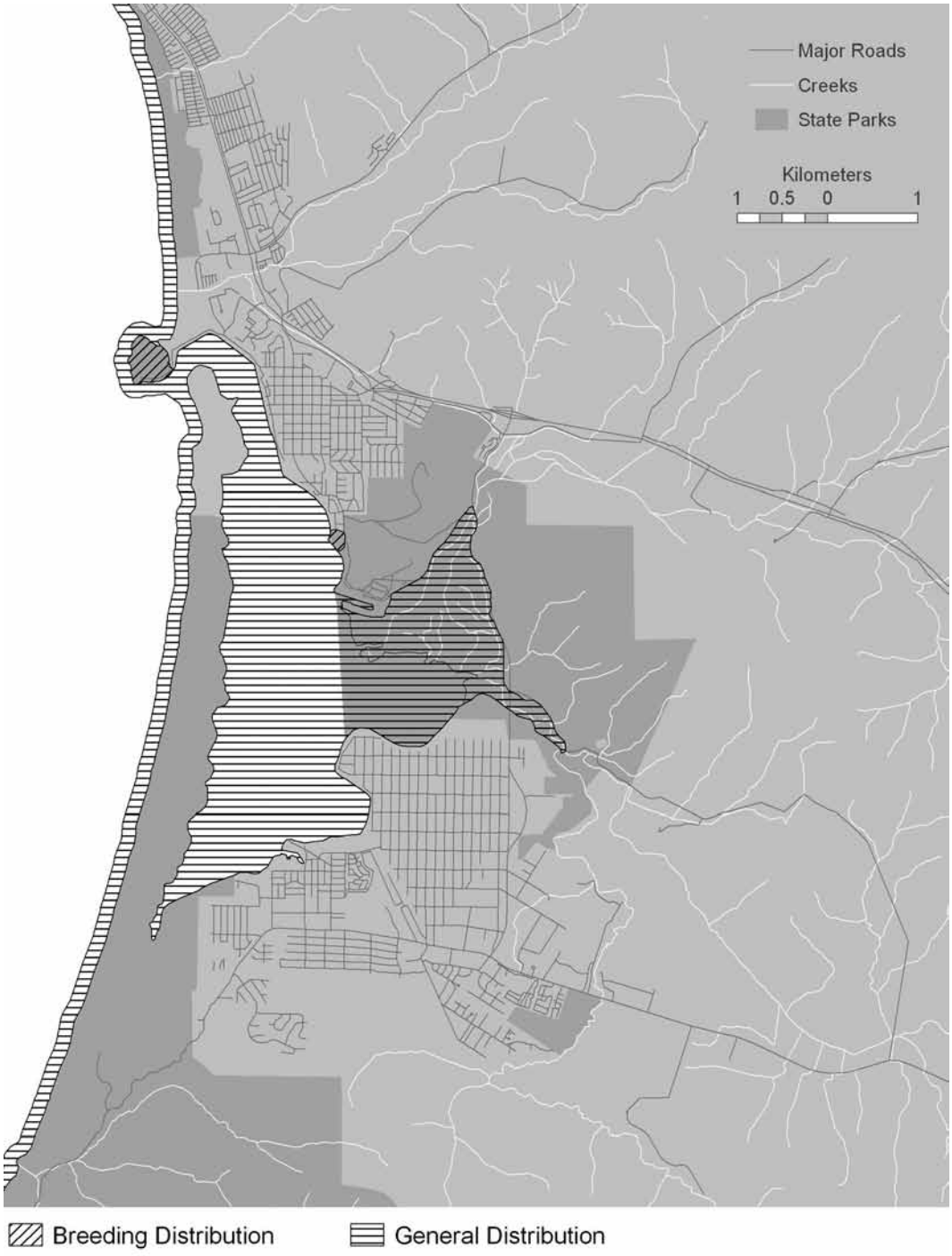
Sensitive Status
Federal: Migratory Bird Treaty Act.
State: G5/S3; Taxa to Watch.
Other: IUCN Least Concern.



Double-crested Cormorant in non-breeding plumage. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Breeding Period: April to September.
Habitat: Found in diverse aquatic habitats such as tidal waters, ponds, lakes, rivers, lagoons, and estuaries.
Nesting: Nest in colonies; in trees near or over water, sea cliffs, or on ground of islands. Females mostly build nest, while males bring materials. Nests are a large platform of sticks and debris, lined with grass and other finer materials. *Clutch Size:* Usually 3 to 4 (1 to 7) bluish white eggs that become nest stained.
Range: Wide range throughout the continental United States. Breeds from Alaska, Manitoba, and Newfoundland south to Mexico and the Bahamas. Winters mainly on coasts north to Alaska and southern New England. Some in Florida and on Pacific Coast are permanent residents.
Identification: A large, 70 to 90 cm (27.6 to 35.4 in), black waterbird with green eyes, and a long tail and neck. It has a pale yellowish to yellow-orange throat pouch, and a thin bill that is hooked at the tip. Breeding birds have fine white plumed "eyebrows", and an intensified yellow-orange throat pouch. Immature birds have brownish tinged underparts with a dingy whitish throat and breast.
Life History: Double-crested Cormorants are the most numerous and widespread cormorant of North America. They feed on a wide variety of fish and other aquatic life by diving from the surface and swimming underwater using feet and sometimes their wings as well. Adults usually breed at the age of 3, at which time the male displays to female by splashing with wing, swimming in a zigzag fashion, and diving to bring up pieces of weeds. Male also displays at nest site by crouching and vibrating wings while calling. Both males and females carry out incubation and feeding of young.
Status in Morro Bay area: The Double-crested Cormorant is a common nester that can be found year round throughout the Morro Bay Estuary and surrounding areas (Beaulieu et al. 2006). It regularly breeds at Fairbank Point, and at least previously on Morro Rock (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Cormorant populations have had fluctuations throughout the past 150 years. Populations greatly decreased in the 19th and early 20th centuries from human factors, gradually increased until the 1950's, then dropped again in the 1960's most likely due to DDT pesticide use. Coastal populations have increased since the early 1980's, and species in California have had a marginal increase in population from 1968 to 2004. Eggs and young may be threatened in the Morro Bay area from non-native animal predators.

DISTRIBUTION *of* DOUBLE-CRESTED CORMORANT (*Phalacrocorax auritus*)



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United States Fish and Wildlife Service. 2004. Code of Federal Regulations. Department of the Interior. Title 50, Part 10.13.

LEAST BITTERN
Ixobrychus exilis

Sensitive Status
Federal: Migratory Bird Treaty Act.
State: G5/S1; Species of Special Concern.
Audubon: IUCN Least Concern.


Adult Least Bittern. Source: Robert Herrington 2004 (Used With Permission).


Adult Least Bittern. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Breeding Period: May to August.
Habitat: Mostly freshwater marsh, but also in brackish marsh, and sometimes salt marsh or mangroves. Usually in tall, dense emergent vegetation, and may be over fairly deep water, as it mostly climbs in reeds rather than wading.
Nesting: Nests are placed in dense, tall stands of vegetation, are mostly built by males, and are widely scattered in marsh, or sometimes in loose colonies. They are built as a platform of bended down marsh vegetation with sticks and plants on top. *Clutch Size:* Usually 4 to 5 (2 to 7) pale green or blue eggs.
Range: Breeds throughout most of eastern United States, Caribbean, and part of Mexico and Central America. Uncommonly breeds very locally in marshes in western U.S. Primarily a summer resident of California, with at least some remaining during winter in the Salton Sink, lower Colorado River valley, and coastal Orange and San Diego counties.
Identification: The smallest heron in North America; growing to 33 cm (13 inches) at maturity. Has a rather long neck for its size, yet is typically seen crouched looking for prey. The Least Bittern is light brown throughout with a black back and cap.
Life History: Feeds mostly on small fish and insects, also crayfish, leeches, frogs, tadpoles, small snakes, and other items. The Least Bittern searches for food by clambering about in vegetation above water, and striking downward with its long bill to catch prey at the waters surface. Both parents feed young by regurgitation. Young may leave nest as early as 6 days if disturbed, but typically remain for 2 weeks, and will stay near nest for another week or more.
Status in Morro Bay area: A rare but fairly regular summer visitor to extensive freshwater marsh of the Central Coast (Marantz 1986). The Least Bittern has historic breeding records from "Los Osos Lake" in San Luis Obispo County from 1932 and late 1960's, which likely refers to Eto (syn. Ito) Lake of Los Osos (Marantz 1986; Sterling 2008; T. Edell 2009, pers. comm., 22 Nov.). In addition, two sub-adults were sighted in the Cloister mitigation wetland area in the early summer of 2005. County records for this species are scarce, and this sighting was assumed to be the first account of the Least Bittern in this area (Walgren et al. 2005).
Threats: Loss and destruction of marsh habitat is the main threat to the Least Bittern. Encroachment of invasive exotic plant species and agricultural runoff into standing marsh are other threats. Operation of watercraft and other human disturbances within or near occupied habitat could also adversely affect bitterns during the breeding season.

DISTRIBUTION *of* LEAST BITTERN (*Ixobrychus exilis*)

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OSPREY
Pandion haliaetus

Sensitive Status
Federal: Migratory Bird Treaty Act**.**
State: G5/S3; Taxa to Watch.
Other: IUCN Least Concern.


Osprey. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Breeding Period: March to September.
Habitat: Occur in lakes, estuaries, rivers, and open seacoast. Found near fresh or salt water where large numbers of fish occur, typically in ponderosa pine through mixed conifer habitats. Migrating Ospreys are sometimes far from water, and may even be seen over desert.
Nesting: Nest site is typically on exposed treetops not far from water. They also nest on utility poles, transmission towers, and other tall structures, or on ground on small islands. Nest is built by both sexes and consists of a bulky pile of sticks, lined with finer material. *Clutch Size:* Usually 3 (2 to 4) creamy white eggs that are blotched with brown.
Range: Breeds in northern California from the Cascade Range south to Lake Tahoe, and along the coast south to Marin County. It is an uncommon breeder along southern portions of the Colorado River, and an uncommon winter migrant along the coast of southern California.
Identification: A large, 54 to 58 cm (21.3 to 22.8 in), long winged raptor with dark brown upperparts and white underparts. They have a light crown and dark eye-line. Males have an all-white throat, while females have a fine, dark "necklace". In flight their long wings are held in a distinctive "M", and they display dark "wrist" patches along with a small, finely banded tail.
Life History: Ospreys are fish-eating specialists, plunging feet first into the water to grasp prey in their talons. Ninety eight percent of their diet consists of live fish that average 1 kg (2 lbs). Couples display courtship rituals by circling high together, and males may fly high then dive in vicinity of the nest site while carrying a stick or fish. Incubation is mostly by female, while the male brings fish to female and young. Not all eggs hatch at once, with some hatching up to five days after the first chick. The older chick will often dominate its siblings and may monopolize the food brought by parents.
Status in Morro Bay area: Osprey occur in low numbers throughout the year in the Morro Bay area (T. Edell 2009, pers. comm., 22 Nov.). Fall migrants begin to appear in the area in late August and early September (Marantz 1986), and although no records exist, this species has the potential to nest in preferred habitat throughout the area (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Ospreys were seriously affected by the use of pesticides in the mid-20th century. DDT and other related pesticides poisoned adults and caused eggshell thinning. After the ban of such harmful pesticides in 1972, Osprey populations increased in many parts of North America. They are still listed as threatened or endangered in some states, especially inland states where populations were thinned or extirpated after the pesticide years.

DISTRIBUTION *of* OSPREY (*Pandion haliaetus*)

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WHITE-TAILED KITE
Elanus leucurus

Sensitive Status
Federal: Migratory Bird Treaty Act.
State: G5/S3; Fully Protected, Taxa to Watch.
Other: IUCN Least Concern.


Adult White-tailed Kite in flight. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).


Adult White-tailed Kite. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Breeding Period: February to October.
Habitat: Found in a wide variety of habitats in North America, including oak savannah, open groves, grasslands, river valleys, and marshes.
Nesting: Nest on tops of trees, often in live oak. Females and males build a platform of sticks and twigs, lined with grasses, weeds, and lichens. *Clutch Size:* Typically 4 (3 to 6) creamy white eggs that are blotched with shades of warm brown. They tend to lay larger clutches in years with abundant rodent populations.
Range: Year-round residents throughout western California, western Oregon, southeastern Texas, and southern Florida in the United States. Also resident throughout much of Central and South America.
Identification: A small, 32 to 38 cm (12.6 to 15 in), falcon-shaped raptor that is strikingly white overall, with a conspicuous long, white tail. They have contrasting black shoulders and a gray back. In flight they have a small black patch on the outer underwing. Juveniles have a buffy wash near the chest that fades within a few weeks.
Life History: This graceful hawk is often seen hovering over open fields while scanning the ground for small rodents to prey upon. Once a food target is spotted, it will steeply dive to catch the prey in its talons. They feed mostly on voles and house mice, but will also occasionally forage on reptiles, amphibians, and large insects. In courtship males will fly near females while peculiarly hovering with their wings in a sharp "V" whilst calling. Females incubate eggs and brood young, while males bring food to the female and nestlings. Adults are monogamous, and may nest two times in the same season.
Status in Morro Bay area: A locally common resident in open fields and marshes throughout the area (Beaulieu et al. 2006). This species fluctuates in numbers with the availability of prey species (T. Edell 2009, pers. comm., 22 Nov.), and is thus seen in greater numbers throughout the area in some years and low in numbers in others.
Threats: In the 1940's this hawk was considered rare and endangered in North America, limited to only a few sites in California and Texas. It has increased in number in recent decades, and is now spread into many new areas. The increase in population size and range may be due to the introduction of the house mouse from Europe, as it formerly fed almost entirely on voles. Current threats within the Morro Bay area are unknown.

DISTRIBUTION *of* WHITE-TAILED KITE (*Elanus leucurus*)

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NORTHERN HARRIER
Circus cyaneus

Sensitive Status
Federal: Bird of Conservation Concern; Migratory Bird Treaty Act.
State: G5/S3; Species of Special Concern**.**
Other: IUCN Least Concern.


Northern Harrier female. Source: Robert Harrington 2005 (Used With Permission).


Northern Harrier male. Source: Robert Harrington 2004 (Used With Permission).

Breeding Period: March to August.
Habitat: Almost any type of open country, including marshes, fields, and prairies. Most often found in marshes, especially during the nesting season, but will sometimes also nest in dry open fields.
Nesting: Often nest in loose colonies on the ground in a dense field or marsh. Nest is typically a platform of sticks, weeds, and grass, or a shallow depression lined with grass. *Clutch Size:* Usually 4 to 6 (2 to 7) pale bluish white eggs, which fade to white and become nest stained; sometimes spotted pale brown.
Range: Breeds widely in North America from northern Alaska and Canada south to mid and lower latitudes of the United States and northern Baja California. Occurs year round in most of its breeding range contiguously throughout the United States and locally in southwester and southeastern Canada.
Identification: A medium-sized hawk, 46 to 50 cm (18 to 19.7 in), with a long tail that has many dark bands, the lowermost band being the widest. Their bill is small, hooked and two-toned. Juveniles and females are brown and rusty colored with striped wing markings. Adult males are gray above with black markings on the edges of the primary and secondary feathers, and have indistinct tail bands.
Life History: Also called the "Marsh Hawk", Northern Harriers are commonly seen foraging for small mammals, birds, and reptiles while flying low over fields. They may also feed on carrion, especially during winter. In courtship males fly up then dive repeatedly in a roller coaster like pattern. During nesting, the male hunts and delivers food, while the female carries out incubation and care of young. After young are about two weeks of age, the female does most of the hunting for them, until they fledge at around 30 to 35 days of old.
Status in Morro Bay area: A fairly common winter visitor throughout grasslands and marshes in the Morro Bay area (Marantz 1986). Only a small percentage of these birds remain throughout summer to breed (Marantz 1986), with the only known recent nesting record at Islay Creek of Montaña de Oro State Park (T. Edell 2009, pers. comm., 22 Nov.), just south of the area of focus for this study.
Threats: The primary threat to breeding harriers is loss and degradation of nesting and foraging habitat, with much of their historic nesting and foraging habitat in California now lost to development. The continual conversion of pastureland and suitable crops, such as alfalfa, to unsuitable crops, such as vineyards and orchards, poses a substantial threat to nesting harriers in the Central Valley. Overgrazing, haying, and widespread use of rodenticides may also degrade habitat by decreasing the number of small mammals in which harriers depend, while additionally destructing ground nests. Other sources of nest failure include off-road vehicle use and other recreational activities, and predation of eggs and young by non-native mammals such as the Red Fox, and feral cats and dogs. The continual decrease in water supplies statewide may also be a threat to harrier nesting habitat in the future.

DISTRIBUTION *of* NORTHERN HARRIER (*Circus cyaneus*)

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Kaufman, K. 1996. Lives of North American Birds. Houghton Mifflin Company, New York. 675 pp.
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___. 2004. Code of Federal Regulations. Department of the Interior. Title 50, Part 10.13.
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SHARP-SHINNED HAWK
Accipiter striatus

Sensitive Status
Federal: Migratory Bird Treaty Act.
State: G5/S3; Taxa to Watch.
Other: IUCN Least Concern.


Sharp-shinned Hawk. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Breeding Period: April to August.
Habitat: Occurs in mixed coniferous forest, open deciduous woodlands, and along thickets of forest edges. Spend winter throughout a variety of forests and bushy areas, typically avoiding open country.
Nesting: Usually nest in coniferous forest and mixed woodland groves in very concealed, dense vegetation. Nest is a platform of sticks lined with twigs, grass, and bark; sometimes on top of an old squirrel or crow nest. *Clutch Size:* Usually 4 to 5 (1 to 6) bluish white eggs that are blotched and washed with brown.
Range: Occur throughout much of North America. Breed north to the treeline of Alaska and Canada, winter south to Panama.
Identification: North America's smallest accipiter, 24 to 34 cm (9.4 to 13.4 in), Sharp-shinned Hawks have a small head and broad wings. Males and females are similar in appearance, with gray upperparts, a rusty chest, and red eyes. Juveniles are dark brown above with a brownish-red mottled chest. Both have wide dark bands across the whole length of the tail and yellow legs. Their wings are held straight out from the body while gliding and they have very quick wing beats.
Life History Sharp-shinned Hawks typically eat small birds. They hunt mostly by perching inside foliage and waiting for small birds to approach, or by catching birds in mid flight with their talons. Courtship displays involve both pairs circling above forests while calling, and sometimes they display fluffy white undertail coverts that are spread to their sides. Males may also present high flights accompanied by sudden, steep dives into woods. Both sexes bring nest material and female does most of the building along with incubation while the male hunts and brings back food.
Status in Morro Bay area: Uncommon from September through May in woodlands and other dense vegetation around the Morro Bay Estuary and surrounding lands (Beaulieu et al. 2006). Casual during summer months, with two records in Montaña de Oro State Park from late June: two birds along Coon Creek in 1981, and a single bird present along Islay Creek in 1984 (Marantz 1986).
Threats: Numbers declined in the mid-20th century likely due to DDT and other harmful pesticides in the food chain. They recovered somewhat throughout the early 1980's, but have had significant declines in eastern United States since. They are listed as a species of concern in several states and provinces, occurring on both prior Species of Special Concern lists from the California Department of Fish and Game. Like most raptors, this species is not well monitored. Understanding its sensitivity to forest fragmentation along with various land-use practices will be important for future conservation efforts.

DISTRIBUTION *of* SHARP-SHINNED HAWK (*Accipiter striatus*)

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COOPER'S HAWK
Accipiter cooperii


Cooper's Hawk adult. Source: Robert Harrington 2003 (Used With Permission).

Sensitive Status
Federal: Migratory Bird Treaty Act.
State: G5/S3; Taxa to Watch.
Other: IUCN Least Concern.

Breeding Period: May to September.
Habitat: Coniferous and mixed forests. Often restricted to wooded areas, but occasionally in open woods or along forest edges. Also occur in parks, quiet neighborhoods, fields, and even along busy streets if there are trees around.
Nesting: Males typically construct nests, which are built in coniferous or deciduous trees such as pines, oaks, Douglas-firs, beeches, spruces, and others. The nest is a bulky structure of sticks with a cup shaped depression in the middle. The cup is often lined with strips of bark and other soft material. *Clutch Size:* Usually 3 to 5 (1 to 7) pale blue to bluish white eggs.
Range: Winter throughout most of the continental United States, and breeds throughout central North America.
Identification: A medium sized accipiter, 37 to 39 cm (14.6 to 15.4 in), with short rounded wings and an elongated, rounded tail. Their head is squarish with red eyes, and they have a blue-gray back with fine, red horizontal barring on their underparts. Juveniles are brown overall, with brown eyes and crisp blackish-brown streaks on the breast. Similar in appearance to the Sharp-shinned Hawk, but is slightly larger with a rather long head and neck.
Life History: Cooper's Hawks feed mostly on small birds by surprise attack. They move from perch to perch in dense cover, then rapidly fly to overtake prey. Unlike falcons, which bite prey to kill it, Cooper's Hawks kill prey by repeatedly squeezing with their talons. They have also been known to drown prey by holding birds underwater until they stop moving. In courtship, both male and female may fly over territory with slow, exaggerated wingbeats. Males not only build nests, but also feed females for up to a month before they begin laying eggs.
Status in Morro Bay area: Occur uncommonly throughout the Morro Bay area during non-breeding winter months (Beaulieu et al. 2006), and are likely rare summer residents and rare breeders in oak woodland habitat throughout the area (T. Edell 2009, pers. comm., 22 Nov.). There is a breeding record from the Hollister Peak area in the 1970's and from Diablo Canyon property in the 1990's (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Numbers declined in the mid-twentieth century mostly due to DDT pesticide use and widespread shooting. Their population has recovered since, and numbers are probably stable in most areas. Current threats within the Morro Bay area are unknown.

DISTRIBUTION *of* COOPER'S HAWK (*Accipiter cooperii*)

Sources:
Beaulieu, J., L. Andreano, and M. Walgren. 2006. Common Birds of the Estero Bay Area. Morro Bay National Estuary Program, Morro Bay, California, and California Department of Parks and Recreation, San Luis Obispo Coast District, San Simeon. 53 pp.
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FERRUGINOUS HAWK
Buteo regalis


Adult Ferruginous Hawk. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Sensitive Status

Federal: Bird of Conservational Concern; Species of Concern; Migratory Bird Treaty Act.
State: G4/S3S4; Taxa to Watch.
Other: Bureau of Land Management Sensitive Species; IUCN Least Concern.

Breeding Period: April to October.
Habitat: Generally occur throughout plains, prairies, and other dry open country. Inhabit dry grassland, sagebrush plains, saltbush flats, rangeland, and deserts. Winter also in agricultural country including over plowed fields.
Nesting: Nest site is usually on top of a tree near streams or on steep slopes, and sometimes on mounds in open desert. Nest is a bulky structure of sticks and debris lined with finer materials. Historically, some nests were constructed with bison bones and lined with bison dung. Nests may become huge as they are sometimes reused and added to annually. *Clutch Size:* Usually 2 to 4 (1 to 8) pale bluish white, fading to white eggs that are usually marked with brown.
Range: Occur throughout arid and semi-arid grasslands across western North America.
Identification: The largest *Buteo* species in North America, 56 to 69 cm (22 to 27.2 in), this hawk has a light and dark phase. Light morph birds are reddish or brownish above, with white underparts, dark leg feathering, and a pail tail. Dark morph birds are less common and are dark overall, with white flight feathers and a narrow white crescent on underside of wrist.
Life History: Feed mainly on small to medium sized mammals such as young jackrabbits, ground squirrels, pocket gophers, and mice. Also eats other birds, snakes, and large insects. Hunts by watching for prey while flying high or low, or from a perch. Sometimes it will wait on the ground near active burrows to catch rodents as they surface. During courtship, pairs may circle high above nesting territories while calling. Both males and females carry out incubation, but females typically spend more time on nest while the male brings her food.
Status in Morro Bay area: Seasonally uncommon throughout the Morro Bay area (Beaulieu et al. 2006), and generally rare along the coast from October through mid-March (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Considered threatened in several states mainly due to habitat loss and other human induced factors such as shooting. Although it has declined greatly over most of its range, there appears to be no substantial decline of wintering birds in California. However, the expansion of urban development and vineyards from former grasslands has reduced its foraging areas throughout the state.

DISTRIBUTION *of* FERRUGINOUS HAWK (*Buteo regalis*)

Sources:
Beaulieu, J., L. Andreano, and M. Walgren. 2006. Common Birds of the Estero Bay Area. Morro Bay National Estuary Program, Morro Bay, California, and California Department of Parks and Recreation, San Luis Obispo Coast District, San Simeon. 53 pp.
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___. 2009. Federally listed, proposed, candidate, delisted species and species of concern which may occur within Oregon. Oregon Fish and Wildlife Office. 20 March 2009 <http://www.fws.gov/oregonfwo/Species/Lists/Documents/OregonStateSpeciesList.PDF>.

GOLDEN EAGLE
Aquila chrysaetos

Sensitive Status

Federal: Bird of Conservation Concern; Migratory Bird Treaty Act.
State: G5/S3; Fully Protected, Taxa to Watch.
Other: Bureau of Land Management Sensitive Species; IUCN Least Concern.

Adult Golden Eagle. Source: Gerald and Buff Corsi © California Academy of Sciences, 2002 (Used With Permission).

Breeding Period: April to October.
Habitat: Inhabits grasslands, deserts, and other open country relatively far away from people.
Nesting: Nest mostly on cliff ledges or sometimes in a large tree overlooking open hunting habitat. Nest is a bulky bowl of sticks, branches, and roots. It is added to and reused for multiple years, and typically measures up to 3 meters (10 feet) across. A pair may have two or more alternate nest sites in which they use in different years. *Clutch Size:* Usually 2 (1 to 4) whitish to buff eggs that are marked with brown.
Range: Found throughout the Northern Hemisphere, common in western North America, but rare in the east.
Identification: The Golden Eagle is one of the largest birds of prey in North America, second only to the Bald Eagle and California Condor in size. It is dark brown overall with a golden nape, that is usually only visual at close range. Legs are feathered down to the talons, and the tail is slightly banded with grayish white. Immature birds in flight show a large white wing patch at base of primaries and white tail with dark terminal band. They are shaped like a hawk, but their wingspan is much larger and their flight is very steady.
Life History: Golden Eagles can take very large prey items such as foxes, young pronghorns, or young deer, but prefer to take mostly smaller mammals such as ground squirrels, prairie dogs, and jackrabbits. Also eats birds ranging in size from cranes to small sparrows, as well as some snakes, lizards, and large insects, and will feed on carrion, including dead fish. Hunts from a prominent perch or from air, plunging towards prey to capture it in its talons. Pairs sometimes hunt together, with the second bird capturing prey that evaded the first. Couples may mate for life, and in courtship two birds circle high in the air while making shallow dives at each other.
Status in Morro Bay area: Uncommon resident throughout the Morro Bay Estuary and surrounding areas (Beaulieu et al. 2006). Golden Eagle's breed in the Irish Hills and likely forage over Montaña de Oro State Park (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Numbers have declined in the west, but are increasing in the east. May not be able to tolerate human disturbances near the nest. Current threats within the Morro Bay area are unknown.

DISTRIBUTION *of* GOLDEN EAGLE (*Aquila chrysaetos*)

Sources:
Beaulieu, J., L. Andreano, and M. Walgren. 2006. Common Birds of the Estero Bay Area. Morro Bay National Estuary Program, Morro Bay, California, and California Department of Parks and Recreation, San Luis Obispo Coast District, San Simeon. 53 pp.
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MERLIN
Falco columbarius

Sensitive Status
Federal: Migratory Bird Treaty Act.
State: G5/S3; Taxa to Watch.
Other: IUCN Least Concern.

Breeding Period: April to September.
Habitat: Occurs throughout open conifer woodland, prairie groves, and semi-open to open country with scattered lookout posts. In migration it also occurs in estuaries, seacoast, marshes, foothills, and open country. Generally breeds in semi-open terrain with trees for nesting and open areas for hunting.
Nesting: Nest site is usually in tree in old nest of hawk, crow, or magpie, 3 to 18 meters (10 to 60 feet) above the ground. They sometimes nest in a large tree cavity, on a cliff edge, or on the ground. There is usually little or no nest material added to existing nests. *Clutch Size:* Usually 4 to 5 (2 to 6) whitish eggs that are lightly or heavily marked with reddish brown.
Range: Occur throughout most of North America to northwestern South America. Breeding populations occur in northwestern United States, Alaska, and Canada.
Identification: Only slightly larger than a kestrel, 20 to 30 cm (9.4 to 11.8 in), the Merlin has a long, narrow heavily banded tail and streaked underparts. Unlike the American Kestrel, they have no distinctive facial stripes. Male birds have a blue-gray back and crown and rusty leg feathers, while females possess a brown back and crown. Adults fly very rapidly with shallow wing beats, and display their banded tail.
Life History: Merlin's hunt mostly small songbirds and shorebirds by snatching them in mid-air at high speeds. They also feed on large insects, rodents, bats, and reptiles. In courtship, males perform spectacular flight displays and bring food and presents to the female. The female mostly carries out incubation, while the male gathers and brings food to the female and young.
Status in Morro Bay area: Uncommon migrant and visitor from late September to mid-April (CDPR staff).
Threats: Included on both prior California Department of Fish and Game special concern lists. Merlin's have increased as migrants and wintering birds in California in recent decades. Current threats within the Morro Bay area are unknown.

Female Merlin. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Male Merlin. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

DISTRIBUTION *of* MERLIN (*Falco columbarius*)

Sources:
Cornell Lab of Ornithology. 2003. All About Birds, Bird Guide. 7 March 2009 <http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/>.
Fix, D., and A. Bezener. 2000. Birds of Northern California. Lone Pine Publishing, Auburn, WA. 384 pp.
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AMERICAN PEREGRINE FALCON
Falco peregrinus anatum


American Peregrine Falcon adult. Source: Gerald and Buff Corsi © California Academy of Sciences (Used With Permission).

Sensitive Status

Federal: Endangered, June 2, 1970; Delisted August 25, 1999; Bird of Conservation Concern; Migratory Bird Treaty Act.
State: G4T3/S2; Endangered, June 27, 1971; Candidate for delisting, November 2, 2007; Fully Protected Species.
Other: IUCN Least Concern; CITES I.

Breeding Period: Early March to late August.
Habitat: Found in a variety of habitats, most with open areas for foraging and cliffs for nesting. When limited by available nest sites and prey, they often move into cities and nest on building ledges and other structures while feeding on pigeons.
Nesting: Nest consists of a shallow, unlined scrape with no nest material added. Usually nest on rocky cliffs or ridges, but some use artificial nesting sites such as bridges and buildings, or in old stick nests in trees from other large birds. Nest sites are traditionally reused. *Clutch Size:* Usually 3 to 4 (2 to 5) whitish to pale reddish brown eggs with dark brown blotches.
Range: Formerly widespread throughout the continental United States, from the North American boreal forest to Mexico. Currently breeds and winters throughout California with the exception of desert regions. Actively nests along the coast north of Santa Barbara, in the Sierra Nevada, and other mountains of northern California.
Identification: A relatively large, 36 to 49 cm (14.2 to 19.3 in), stocky blue-gray falcon with a black hood and wide black "mustache". They have a very distinct downward pointed bill and a uniformly patterned under wing with fine, dark transverse barring and spotting.
Life History: Feed mostly on medium-sized birds by diving at incredible speeds to catch their prey, and some have been clocked at speeds up to 354 kph (220 mph). Females are larger than males and therefore may take larger prey items. They typically hunt in the air, either by striking prey to the ground, or killing prey outright by a deadly blow from their talons. In addition, they may pursue prey in a low, fast flight or attack passing birds from a perch. Sometimes pairs hunt together, feeding on jays, meadowlarks, flickers, starlings, shorebirds, waterfowl, and other readily available species. They also occasionally feed on lemmings and voles when present. Peregrine Falcons may mate for life. Territorial and courtship displays include high circling flight by males and stunning dives and chases by both sexes. Females mainly incubate the eggs while being fed by the male. They continually defend the immediate area of nest from intruders, but may hunt up to 16 to 20 km (10 to 12 miles) away.
Status in Morro Bay area: An uncommon transient and winter visitor throughout the Central Coast (Marantz 1986). There are breeding adults on Morro Rock that forage at Morro Strand State Beach and surrounding areas (Walgren et al. 2005), and adults bred on Hollister Peak in 2006 (T. Edell 2009, pers. comm., 22 Nov.).
Threats: These birds were once listed as endangered due to DDT pesticide poisoning from the 1950's to 60's, which caused direct mortality and thinning of their eggshells. Some peregrines along the central coast of California are still experiencing elevated concentrations of DDE and PCB organochlorine compounds. Other threats include shooting, collision with power lines, contaminated prey, and disturbance at nest sites. In addition, rock climbing, road construction, timber harvest, loud aircrafts, and other human disturbances may cause peregrines to abandon their nest sites entirely.

DISTRIBUTION *of* AMERICAN PEREGRINE FALCON (*Falco peregrinus anatum*)

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PRAIRIE FALCON
Falco mexicanus

Prairie Falcon. Source: Robert Harrington 2004 (Used With Permission).

Sensitive Status
Federal: Bird of Conservation Concern; Migratory Bird Treaty Act.
State: G5/S3; Taxa to Watch.
Other: IUCN Least Concern.

Breeding Period: Mid-February to mid-September.
Habitat: Typically found in fairly dry open country in open hills, plains, prairies, and deserts. They usually breed in river canyons, cliffs, arid open lowlands, or high intermontane valleys.
Nesting: Nest site is usually on a cliff edge in crevices protected by an overhang of rock. Sometimes will use pre-existing nest of other raptors or Common Ravens, and will rarely nest in trees. Nest is a simple scrape in gravel or dirt on ledge. *Clutch Size:* Usually 3 to 5 (2 to 8) whitish eggs that are spotted with brown.
Range: Occurs throughout western United States, north to southwestern Canada and south to northern Central America.
Identification: A large falcon, 37 to 47 cm (14.6 to 18.5 in), with a pale brown back and a dark brown, narrow "mustache" stripe. Their underparts are white with brown spotting. In flight they have diagnostic dark "wing pits", pointed wings, and a long, narrow banded tail. Both sexes are similar in appearance and coloration, but the female is typically larger in size.
Life History: Prairie Falcons eat mostly small birds and mammals. In spring and summer they seem to prefer ground squirrel colonies, readily swooping over grasslands to pick up naive juveniles. During fall they feed mostly on large flocks of migrating songbirds. Courtship involves calling near potential nesting sites and a lot of flying about. Males perform aerial acrobatics and will often strut back and forth at nest site. Females incubate eggs and stay with young for a month after hatching.
Status in Morro Bay area: A rare fall migrant and winter visitor throughout the Morro Bay area (CDPR staff; T. Edell 2009, pers. comm., 22 Nov.).
Threats: The Prairie Falcon was not as badly affected by the DDT pesticide era as the Peregrine Falcon. It has declined in some developed areas, but current populations are becoming somewhat stable. Current threats to this species within the Morro Bay area are unknown.

DISTRIBUTION *of* PRAIRIE FALCON (*Falco mexicanus*)

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Cornell Lab of Ornithology. 2003. All About Birds, Bird Guide. 7 March 2009 <http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/>.
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CALIFORNIA BLACK RAIL
Laterallus jamaicensis coturniculus


Adult California Black Rail. Source: Ashok Khosla 2009 (Used With Permission).

Sensitive Status

Federal: Bird of Conservation Concern; Species of Concern; Migratory Bird Treaty Act.
State: G4T1/S1; Threatened, June 27, 1971; Fully Protected Species.
Other: American Bird Conservancy Red List Species; Audubon WatchList Red; IUCN Near Threatened.

Breeding Period: March to June.
Habitat: Occurs most commonly in tidal emergent wetlands dominated by pickleweed, or in brackish marshes that support bulrushes in association with pickleweed. Also occur in freshwater cattail and bulrush marshes at lower elevations.
Nesting: Nest is built in high portions along the edge of salt or freshwater marshes in damp areas with dense vegetation and also in grassy wet meadows. Nests are a deep dome of vegetation with a canopy cover and "ramp" connecting the opening to the ground or water. *Clutch Size:* Average of 6 (3 to 8) creamy white eggs with fine brown spots.
Range: In the mid 1940's the California Black Rail could be found in salt marshes bordering large bays on the California coast from Tomales Bay, Marin County, to San Diego County. By the 1950's the California Black Rail was considered to be absent from coastal southern California entirely. About 90% of California Black Rails are estimated to reside in the San Francisco Bay estuary, notably the tidal marshland of San Pablo Bay and associated rivers. The other 10% (perhaps only several hundred individuals) occur in outer coastal tidal marshes, swales and small pond margins in the low Sierra foothills, and freshwater marshes associated with the Colorado River and the Salton Sea.
Identification: This is the smallest rail species, at only 10 to 15 cm (3.9 to 5.9 in) in length. It is blackish-brown in color with a short black bill and a brown nape. Its back is speckled with small white spots, and its flanks and undertail are streaked with white and dark gray. It can be as difficult to see as a mouse and is very hard to flush.
Life History: California Black Rails are extremely secretive ground foraging insectivores that are most active and vocal at dusk. They feed primarily on insects, but occasionally feed on crustaceans and aquatic plant seeds as well. Males and females both vocalize on breeding grounds and may form pairs. They are mostly non-migratory birds, however, both adults and juveniles have been recorded as far as 32 km (20 miles) away from their nearest suitable breeding habitat.
Status in Morro Bay area: Appears to be a very rare resident of the Morro Bay Estuary, with current numbers in decline. There are specimen records of dead birds picked up, sight records, and reports of birds being heard throughout the early 2000's. In addition, four birds responded to recorded calls in a 2001 breeding survey by Chris Sulzman (T. Edell 2009, pers. comm., 22 Nov.). Current survey efforts by the National Audubon Society detected California Black Rail responses at Sweet Springs Nature Preserve on the 8th of November and 8th of December in 2009, which were likely from a single individual (A. Jones 2010, pers. comm., 22 Feb.). It has been officially documented in the past at Sweet Springs Nature Preserve (CNDDB 2009), and along Turri Road (Marantz 1986).
Threats: Habitat loss was the main cause of California Black Rail decline throughout the past. High marsh inhabitants such as the Black Rail reside in habitat just above the tideline, which acts as a buffer zone and provides refuge during periods of flooding. Loss of higher wetland habitat in the San Francisco Bay has possibly led to the elimination of Black Rail breeding in the south bay area. Other threats include droughts, erosion, grazing and agriculture, pesticides, pollution, changes in water quality, dikes, and progressive rises in sea level. Threatened in the Morro Bay area by introduced mammals, such as the Red Fox and household pets. Also may be threatened in the area by sedimentation and encroachment of upland habitat, along with potential sea-level rise induced by global climate change.

DISTRIBUTION *of* CALIFORNIA BLACK RAIL (*Laterallus jamaicensis coturniculus*)

Sources:
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WESTERN SNOWY PLOVER
Charadrius alexandrinus nivosus

Western Snowy Plover, breeding adult. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Sensitive Status

Federal: Threatened, March 5, 1993; Bird of Conservation Concern; Migratory Bird Treaty Act.
State: G4T3/S2; Species of Special Concern.
Other: American Bird Conservancy Declining Yellow List Species; Audubon WatchList Yellow; IUCN Least Concern.

Breeding Period: April to early October.
Habitat: Occur on beaches, bayshore sandflats, sandspits, and drier shorelines of tidal estuaries. They are usually in places with very little vegetation, and tend to occur where habitat matches the pale color of its back.
Nesting: Nest on bare sand in or around coastal debris near the ocean-side of fore dunes. Nests consist of a shallow scrape lined with pebbles, shells, plant matter and other debris. *Clutch Size:* Usually 3 (2 to 4) pale buff eggs that are blotched with brown and black dots.
Range: The general species can be found across North and South America, Eurasia, and Africa. The Western Snowy Plover in North America is restricted to the Pacific Coast and Gulf of the United States, with one of the last larger breeding populations being Estero Bay.

Western Snowy Plover eggs and hatchling. Source: California Department of Parks and Recreation.

Identification: A Fairly small plover, 15 to 17 cm (5.9 to 6.7 in), with light brown colorations on back, white underparts, and variable dark patches on the ear, shoulder, and forehead. It has a thin, pointed black bill and slate colored legs. Breeding birds have a black bar across forehead.
Life History: Snowy plovers feed on tiny crustaceans, mollusks, marine worms, and insects. They often forage in loose flocks by running and stopping, then pecking to seize prey. They also probe in the sand for food and can capture flies while running with open mouths. Incubation is by both parents, with the male usually incubating at night, and the female incubating during most of the day. Adults may protect their eggs or young from encroaching predators by putting on a "broken-wing" display, involving fluttering on the ground as if injured in an attempt to bait predators away. Once hatched (within 26 to 32 days), downy young plovers leave their nest within a few hours. They can feed themselves nearly immediately, but are still protected and tended to by parents until about a month old.
Status in Morro Bay area: Nest along the entire sandspit of Montaña de Oro State Park along with southern Morro Strand State Beach from April to early October (CDPR staff).
Threats: The main threat to the Western Snowy Plover is loss and degradation of habitat and breeding grounds caused by foot traffic and recreational vehicles during their breeding season. Many conservational efforts have been made to rehabilitate the species including the closing of nesting beaches, roping off or fencing breeding sites, posting educational signs, and banning pets and vehicle use. Despite short successes, the long-term survival of the Western Snowy Plover is still not certain. No nests have been documented at the northern portion of Morro Strand State Beach, where recreational activity and a lack of protection may be prohibiting nesting.

DISTRIBUTION *of* WESTERN SNOWY PLOVER (*Charadrius alexandrinus nivosus*)

Sources:
American Bird Conservancy. 2007. The WatchList 2007. 25 March 2009 <http://www.abcbirds.org/abcprograms/science/watchlist/>.
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BLACK OYSTERCATCHER
Haematopus bachmani

Sensitive Status
Federal: Bird of Conservation Concern; Species of Concern; Migratory Bird Treaty Act.
State: G5/S2.
Other: IUCN Least Concern.

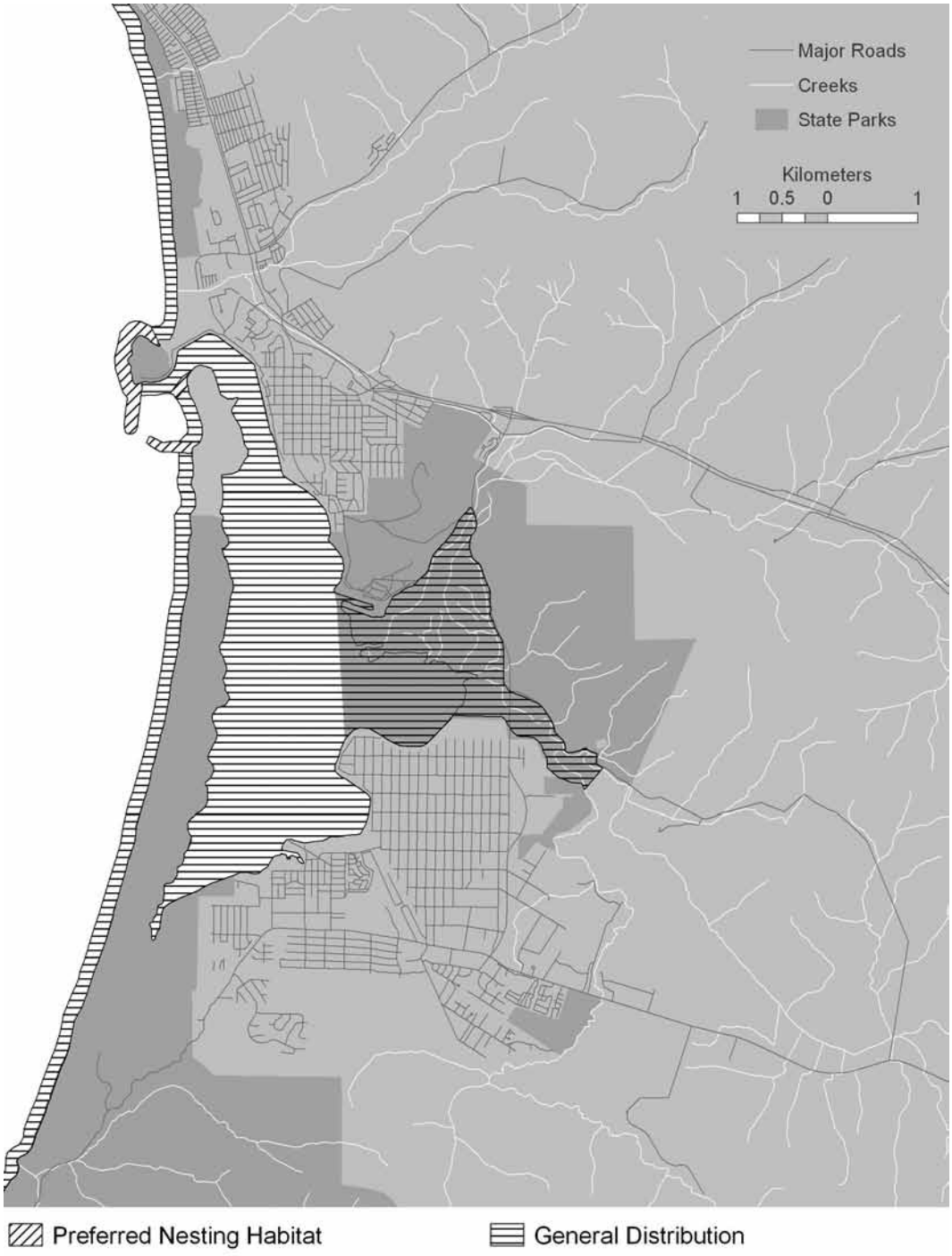

Black Oystercatcher adult. Source: Oliver Hernandez 2007.

Breeding Period: April to August.
Habitat: Occur along rocky coasts, sea islets, and occasionally sandy beaches. In winter, they are also commonly found on mudflats near rocky shorelines.
Nesting: Nest almost exclusively on offshore rock and islands, sometimes on pebbly substrate in shallow depressions. The nest itself is a small scrape with sparse lining of pebbles and pieces of shell, built by both male and female. *Clutch Size:* 2 to 3 (1) pale buff to olive eggs that are spotted and scrawled with brown and black.
Range: Occur along the Pacific Coast from the Aleutians and southern Alaska to Baja California.
Identification: A large, 42 to 47 cm (16.5 to 18.5 in), black shorebird with a distinctive large red bill and pink legs. They have yellow eyes surrounded by a red ring of skin. If disturbed, they take flight with loud, ringing whistles that can easily be heard from across the beach.
Life History: These birds use their thick long bill to pry open or cut the clamping muscles of bivalves, including the oyster by which it gets its name. They forage mostly near low tide and when feeding on mussel beds they typically remove the mussel from its shell, leaving the shell in place on the rock. Adults may mate for life and take turns guarding and catching food for their young.


Black Oystercatcher eggs. Source: Oliver Hernandez 2007.

Status in Morro Bay area: Somewhat common residents throughout the area. Occur throughout shoreline of Morro Strand State Beach, sandpit and coast of Montaña de Oro State Park, and occasionally along estuarial mudflats. Black Oystercatchers may nest along Morro Rock, jetties, breakwaters, as well as pebbly coves and beaches throughout the area, as seen at Villa Creek of Estero Bluffs State Property (CDPR staff).
Threats: Still somewhat widespread along the Pacific Coast, however vulnerable to effects of oil spills and other pollution in the intertidal zone. They are also very vulnerable to disturbance at nesting sites, and recreational activities may prohibit nesting throughout the area.

DISTRIBUTION *of* BLACK OYSTERCATCHER (*Haematopus bachmani*)



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WHIMBREL
Numenius phaeopus


Adult Whimbrel. Source: Robert Harrington 2006 (Used With Permission).

Sensitive Status
Federal: Bird of Conservation Concern; Migratory Bird Treaty Act.
State: None.
Other: IUCN Least Concern.

Breeding Period: Early June to late August.
Habitat: Occur along coastal shoreline habitats, including estuaries, beaches, mudflats, saltwater marshes, breakwaters, and rocky shores. During migration they may use lawns, flooded fields, freshwater marshes, and lake margins.
Nesting: Nest on ground, typically in a dry raised area near low-lying wet tundra. Females likely do most if not all of the nest building, creating a simple shallow depression lined with pieces of lichen, moss, and vegetation. *Clutch Size:* Usually 4 (3) olive to buff eggs that are blotched with shades of brown.
Range: Has a wide wintering range, from Pacific and southeastern coasts of the United States to southern South America. They nest in northern Canada and Alaska.
Identification: A large shorebird, 44 cm (17.3 in), with a long down-curved bill, mottled brown body, and long legs. They have a dark eye-line and a striped crown. In flight they show even-colored, dark underwings. Whimbrels are commonly mistaken for Long-billed Curlews, however the latter lacks a striped crown, has a much larger bill, and exhibits warm orange-cinnamon underwing linings.
Life History: Whimbrels are often seen walking on open flats, probing and picking up insects and crustaceans. On the coast they often eat many crabs, along with amphipods, marine worms, and small mollusks. On breeding grounds they begin feeding mostly on insects, but consume berries as a major part of their diet by late summer. During the early breeding season, males perform flight displays while singing over nesting territory. On the ground, members of a pair may call together. If you happen to wander into nesting territory, you may endure an intimidating aerial attack by defensive parents. Both members of a pair incubate and tend to young, which feed themselves.
Status in Morro Bay area: Uncommon but regular along Morro Strand State Beach and sandspit of Montaña de Oro State Park in winter, rarely on the estuary (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Market hunters' seriously depleted Whimbrel populations in the late 19th century. Today there is no definitive information on population trends. The greatest current threat to the species is loss of coastal wetland habitat. They are also at risk from environmental contamination; including cadmium wastes form mining in Chile.

DISTRIBUTION *of* WHIMBREL (*Numenius phaeopus*)

Sources:
Cornell Lab of Ornithology. 2003. All About Birds, Bird Guide. 7 March 2009 <http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/>.
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LONG-BILLED CURLEW
Numenius americanus

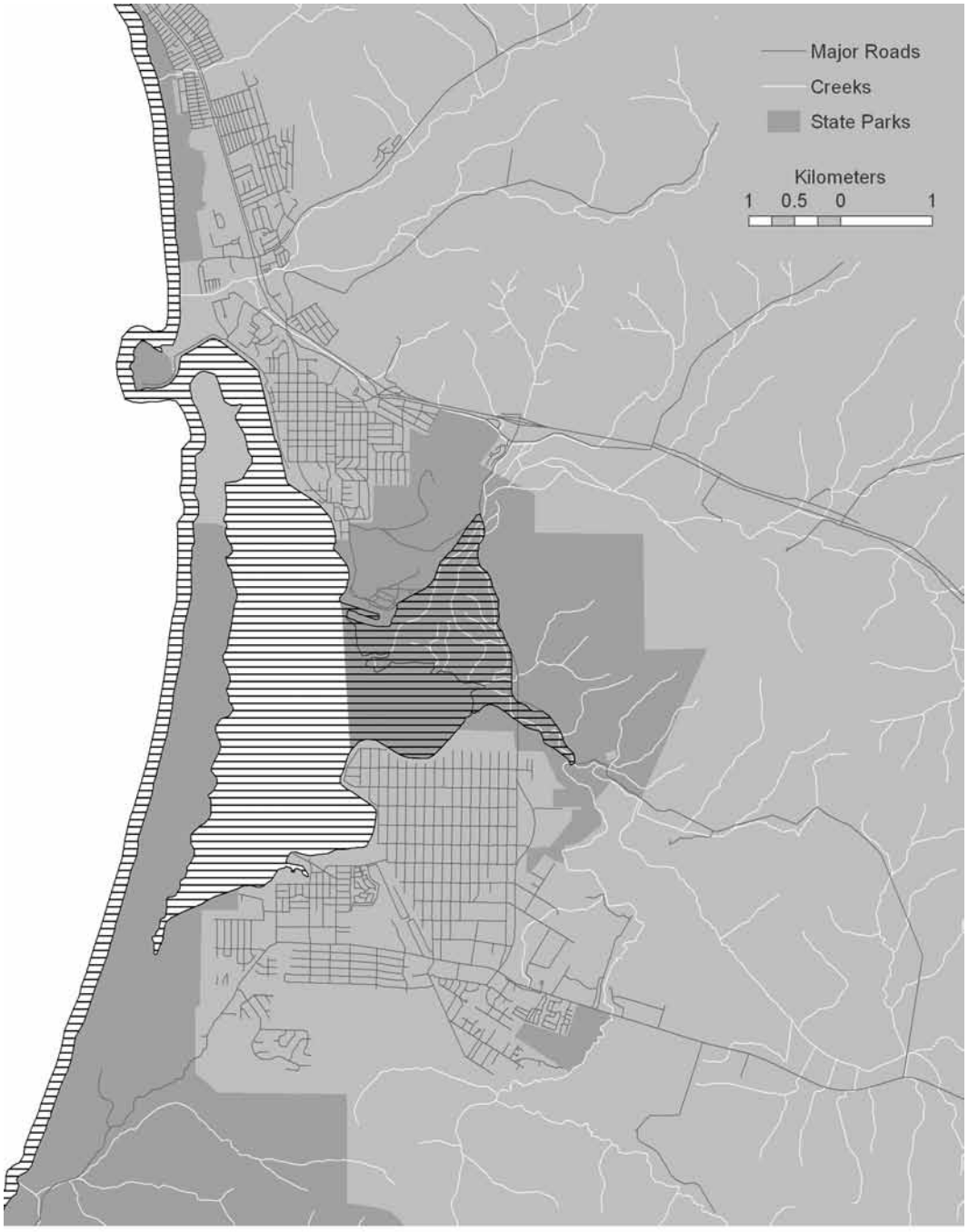

Long-billed Curlew adult. Source: California Department of Parks and Recreation.

Sensitive Status

Federal: Bird of Conservation Concern; Species of Concern; Migratory Bird Treaty Act.
State: G5/S2; Taxa to Watch.
Other: American Bird Conservancy Declining Yellow List Species; Audubon WatchList Yellow; IUCN Least Concern.

Breeding Period: April to August.
Habitat: Occurs in tidal mudflats, saltwater marshes, estuaries, tidal channels, and sandy beaches. Also often found in grasslands and agricultural fields with short grasses.
Nesting: Breeds in grasslands that contain lakes or marshes and creates nest on open ground. Nest is a slight depression that is thinly lined with grass and other debris. *Clutch Size:* Usually 4 (3 to 5) pale buff to olive-buff eggs that are evenly spotted with brown and dark olive.
Range: Breeds from southeastern British Columbia eastward to northeastern California and New Mexico. Winters from central California and coastal Texas to Mexico. There are also some along the Atlantic Coast and upper Pacific Coast. In addition, a few small populations of curlews breed in the Great Basin Desert, Modoc Plateau, and Klamath Basin of northeastern California.
Identification: Long-billed Curlews are large shorebirds, 50 to 65 cm (19.7 to 25.6 in), with speckled brown and gray bodies and long, dull bluish gray legs. They have an extremely long downward curved bill and the undersides of their wings are bright cinnamon in color. Both sexes are similar in appearance, but females are slightly larger and have a longer bill.
Life History: Long-billed Curlews eat mostly insects including beetles, grasshoppers, caterpillars, and others. Also eats spiders and toads, and will occasionally eat the eggs and young of other birds. In coastal areas they additionally eat crabs, mollusks, crayfish, marine worms, and other large invertebrates. They forage by probing just below the surface of mud or soil, and will also walk quickly and pick up insects ahead of them with their long bill. Male's display over nesting territory with undulating flights while giving loud ringing calls. Both parents tend to young by leading them to marshy or damp areas for better feeding. Young feed themselves and can fly in one to one and a half months.
Status in Morro Bay area: Occur throughout Morro Strand State Beach, sandspit of Montaña de Oro State Park, and Morro Bay Estuary in winter months. They are typically found along shorelines foraging for food (Walgren et al. 2005), and also occur in low numbers on the Morro Bay Estuary in summer (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Breeding grounds for the Long-billed Curlew have decreased remarkably within the past 80 years, and it is estimated that more than two thirds of its historic breeding range has been destroyed. Their habitat has declined due to expansion of croplands, urbanization, and/or the redirection of water. They also face significant threats on salt marshes, tidal flats, and grasslands where they winter due to habitat loss. The U.S. Fish and Wildlife Service has created optimal management practices for the conservation of this shore bird. Their recommendations include grassland preservation, attentive timing of controlled burns, reduced pesticide use near breeding sites, and rotational grazing.

DISTRIBUTION *of* LONG-BILLED CURLEW (*Numenius americanus*)



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MARBLED GODWIT
Limosa fedoa

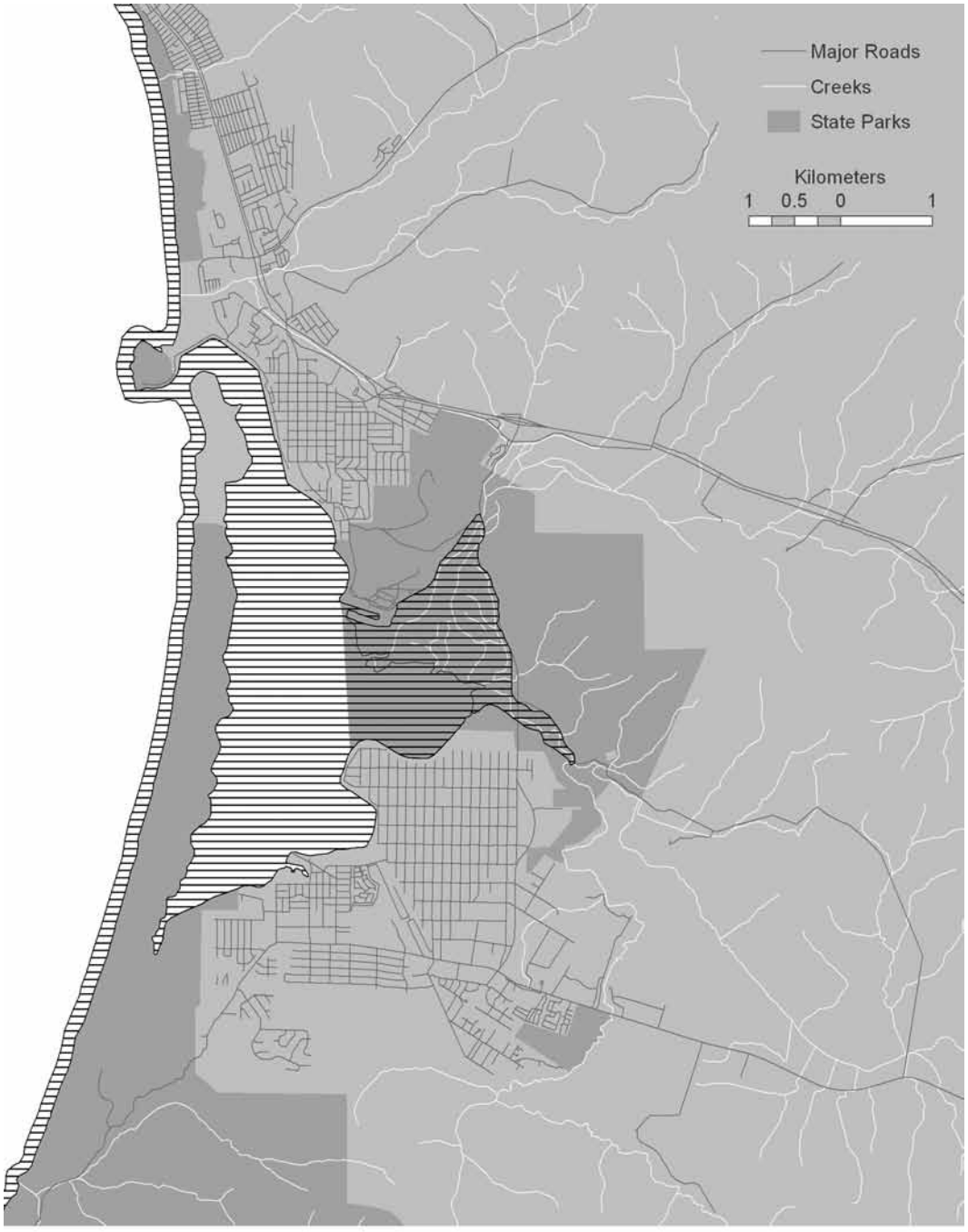

Adult Marbled Godwit. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Sensitive Status

Federal: Bird of Conservation Concern; Migratory Bird Treaty Act.
State: None.
Other: American Bird Conservancy Rare Yellow List Species; Audubon WatchList Yellow; IUCN Least Concern.

Breeding Period: May to August.
Habitat: Occur in prairies, shorelines, tideflats, and floodplains. Breeds in marshes and flooded plains, migrates and winters in estuaries, tidal mudflats, saltwater marshes, and tidal channels. Also often occur in grasslands and agricultural fields with short grass.
Nesting: Marbled Godwits may nest in loose colonies. Site is on ground and usually in short grass, on a dry spot fairly close to water. Nest consists of a slight depression lined with dry grass and occasionally with a slight canopy of grass arranged above the nest. *Clutch Size:* Usually 4 (3 to 5) greenish to olive-buff eggs that are lightly spotted with brown.
Range: Breed on northern Great Plains and Canadian prairies, and breed locally along the west coast of Alaska. Migrates in flocks to coastal regions in winter, with most occurring north of Panama, and some reaching South America.
Identification: A crow-sized shorebird, 42 to 48 cm (16.5 to 18.9 in), with a long neck and a long, upturned pinkish bill with a dark tip. They are buffy-brown throughout, with a dark-and-light mottled pattern on their back, and cinnamon-buff underparts. Breeding birds are finely barred with dark across the underparts, while non-breeding birds are plainer beneath, with only slight streaks. In flight they flash cinnamon-orange wing linings.
Life History: Marbled Godwits feed mostly on insects while on prairies, and on mollusks, marine worms, crustaceans, and other invertebrates while on the coast. They generally feed by probing in water or mud with their long bill. Male godwits display over breeding grounds by flying over the area while loudly calling. During nest preparation, couples may go through a ritualized nest scraping display. Both parents tend young, but young find food on their own.
Status in Morro Bay area: An uncommon winter resident throughout salt marsh and beaches of the Morro Bay Estuary and surrounding areas (Walgren et al. 2005). In addition, there are usually 200 to 500 individuals present on the estuary during summer, which are likely non-breeding year old birds (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Marbled Godwit populations were greatly reduced during the 19th century mostly from market hunting, but stabilized after restrictions. Today there are indications of small population declines, mostly attributed to loss and degradation of breeding habitat. Invasive exotic species, draining of seasonal wetlands, highway expansion, fire suppression, and conversion of short grass prairie to cropland all continue to degrade Marbled Godwit breeding ground and wintering habitat.

DISTRIBUTION *of* MARBLED GODWIT (*Limosa fedoa*)



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BLACK TURNSTONE
Arenaria melanocephala

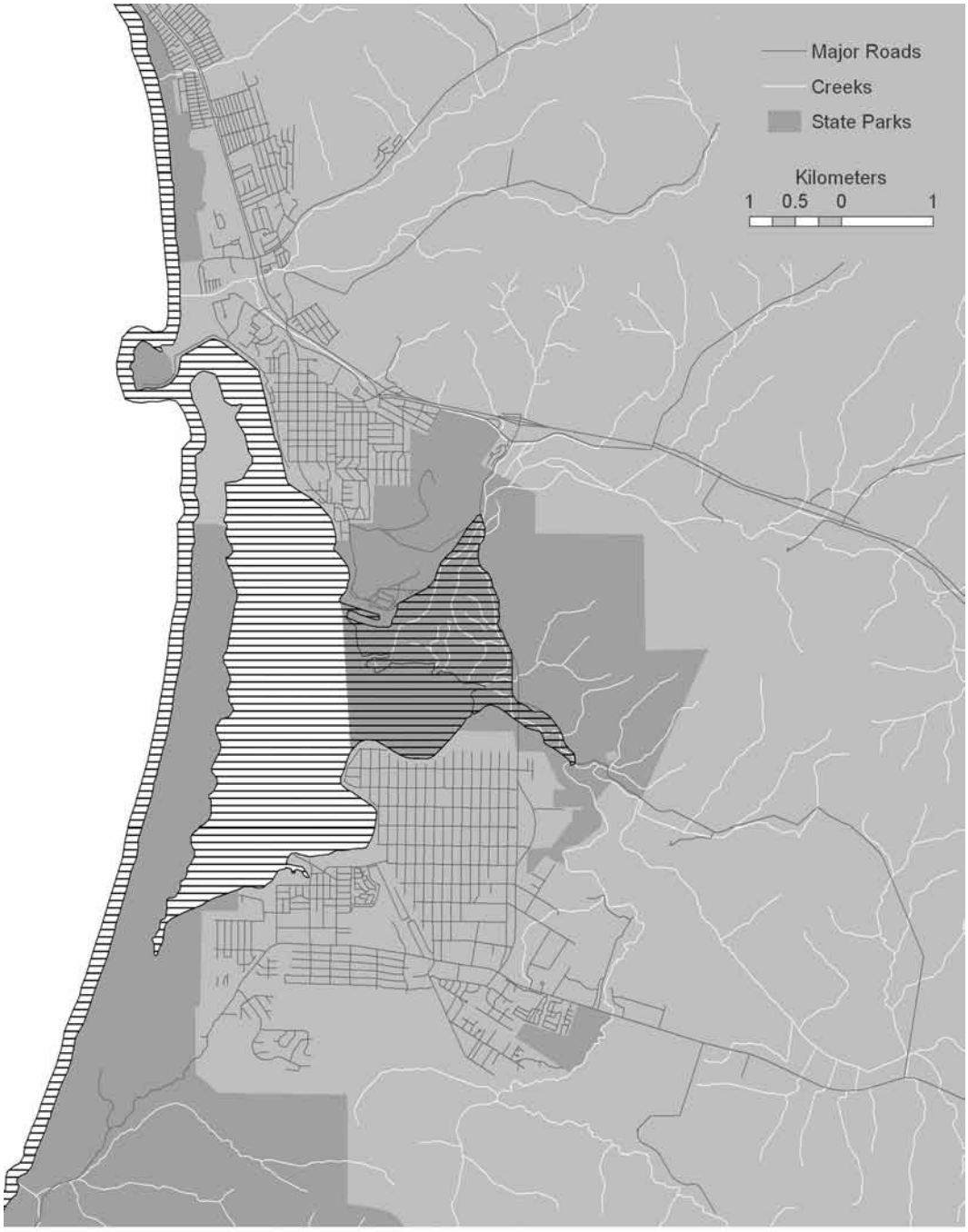

Black Turnstone. Source: Joy Gross 2005 (Used With Permission).

Sensitive Status

Federal: Bird of Conservation Concern; Migratory Bird Treaty Act.
State: None.
Audubon: American Bird Conservancy Rare Yellow List Species; Audubon WatchList Yellow; IUCN Least Concern.

Breeding Period: Early May to August.
Habitat: Black Turnstones are strictly coastal; occurring on rocky shores, break waters, and islets. They also occur on mudflats and sandy beaches during migration and winter.
Nesting: Nest in coastal tundra on the ground, usually close to water and nest is either in open or hidden by tall grasses or sedges. Nest is likely built by both parents and consists of a shallow depression lined with grasses and other vegetation. *Clutch Size:* Usually 4 (3) yellowish green to olive eggs that are blotched with dark brown.
Range: Along Pacific Coast from Alaska to southern Baja and Gulf of California. Breeds only in coastal Alaska.
Identification: Black Turnstones are stout, medium sized, 22 to 25 cm (8.7 to 9.8 in), shorebirds with a slightly upturned bill. They have blackish underparts, a white belly, and dark to dingy orange legs and feet. In breeding plumage, adults have a strong white mark near the base of the bill along with a weak white eyeline. In flight they show two white wing marks and a large white patch on the back.
Life History: Black Turnstones forage mostly by walking slowly on rocks. When feeding on acorn barnacles they may insert bill in shell to pry it open, or hammer on shell to break it. Limpets and other mollusks are pried from rocks with the use of their pointed bill. On beaches they typically turn over rocks, shells, or seaweed to search for food underneath. During courtship, males display circular flight over territory. Adults often mate for life and return to the exact same site to nest each year. Both parents tend to young at first, but female usually leaves after about two weeks from hatching, leaving the male to care for them alone.
Status in Morro Bay area: Commonly occur along rocky shores and sandy beaches throughout the Morro Bay Estuary and surrounding areas during migration and winter months (Walgren et al. 2005).
Threats: Black Turnstones have a very small breeding distribution and are therefore subjected to higher risk of being seriously affected by a major catastrophe. The Exxon Valdez oil spill caused extensive contamination of turnstone prey items within their breeding territory, however no studies were conducted on the impact of Black Turnstone populations at the time. Their wintering range is within areas that include the major Pacific Coast oil production and transportation facilities, which place them at risk to future oil spills.

DISTRIBUTION *of* BLACK TURNSTONE (*Arenaria melanocephala*)



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Walgren, M., L. Andreano, J. Beaulieu, S. Christopher, and C. Jackson. 2005. Resource inventory for Morro Strand State Beach. California Department of Parks and Recreation, San Luis Obispo Coast District, San Simeon.

SANDERLING
Calidris alba

Sensitive Status

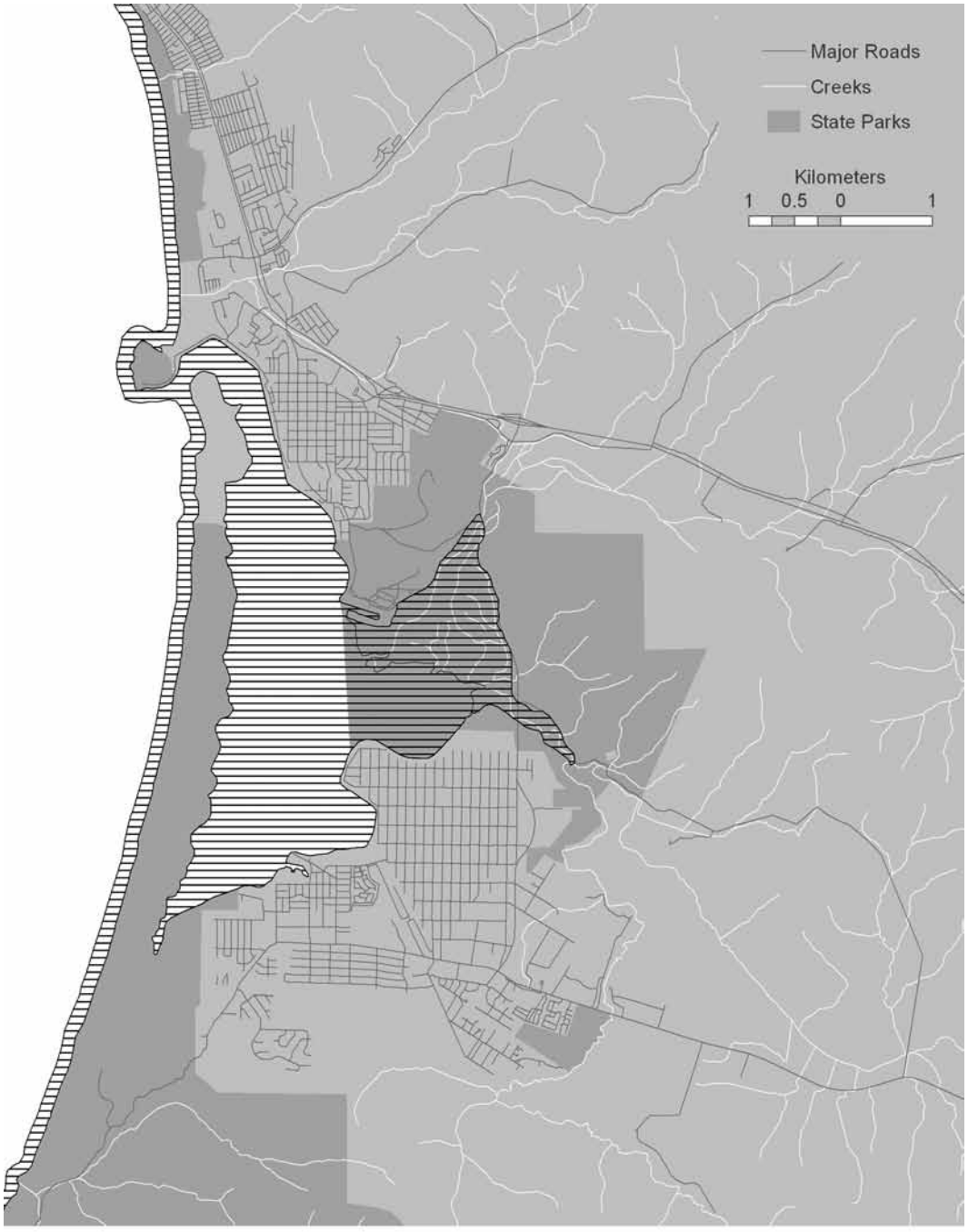
Federal: Bird of Conservation Concern; Migratory Bird Treaty Act.
State: None.
Other: American Bird Conservancy Declining Yellow List Species; Audubon WatchList Yellow; IUCN Least Concern.


Sanderling female. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).


Sanderling male. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Breeding Period: Late May to early August.
Habitat: Occur on tidal flats, typically on the lower wave slope of sandy ocean beaches. Also on rocky shorelines, breakwaters, tidal mudflats, and estuaries. Occasionally seen on inland mudflats and freshwater lake shores.
Nesting: Nest site is on ground, typically in an open, barren spot that may be higher than surroundings. Nest is a shallow scrape that is generally lined with small leaves and other debris. *Clutch Size:* Usually 4 (3) olive green to pale brown eggs that are sparsely spotted with black and brown.
Range: Very cosmopolitan, wintering throughout temperate shorelines on every continent but Antarctica. Breed across the Arctic; in Alaska, Canada, and Asia.
Identification: A small, 18 to 20 cm (7.1 to 7.9 in), pallid shorebird when found on the coast. Overall, they have a pale gray back and pure white underparts, a short black bill, and black legs. In flight they show a black leading edge with a broad white wing tip. Breeding birds have a rusty head and breast with dark mottling. Juveniles are white edged with blackish upperparts, and have a conspicuous buffy washed upper breast. Sanderlings are similar in appearance to other sandpipers, but lack a hind tow on their feet.
Life History: Sanderlings usually congregate in groups along the shore edge feeding mostly on sand crabs and other invertebrates as waves recede, and they quickly retreat before the incoming waves reach them. They are also known to eat some carrion, and wintering birds on the southern coast of California may eat corn chips and other junk food left behind by people. In the breeding season, unmated males will perform low display flights, along with fluttering and gliding while giving off harsh chirring sounds. On the ground, the male will ruffle its feathers and run toward females with their heads hunched down. Both parents incubate young, with female possibly leaving to begin a second clutch with another mate.
Status in Morro Bay area: Sanderlings are common to shores throughout the Central Coast of California during the non-breeding season. Occurring on estuarial mudflats, the sandspit and other shorelines of Montaña de Oro State Park, and Morro Strand State Beach (Walgren et al. 2005).
Threats: Sanderlings have been in serious decline throughout their global range, with population declines as much as 80% since the early 1970's. Habitat loss and human disturbance pose the main threat to this species, as they heavily rely on only a few staging areas during migration and wintering months.

DISTRIBUTION *of* SANDERLING (*Calidris alba*)



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SHORT-BILLED DOWITCHER
Limnodromus griseus


Short-billed Dowitcher. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Sensitive Status
Federal: Bird of Conservation Concern; Migratory Bird Treaty Act.
State: None.
Other: IUCN Least Concern.

Breeding Period: Late May to early August.
Habitat: Occur in mudflats, estuaries, and saltwater marsh. Uses flooded fields, lakeshores, and ponds during migration.
Nesting: Typically nest far inland on the ground in a forest clearing, bog, or edge of tundra, often near water. Nest is a shallow depression in a clump of grass or moss, and is lined with small leaves, twigs, and fine grass. *Clutch Size:* Usually 4 (3) olive-buff to brown eggs that are marked with brown.
Range: Breed in Alaska, and central and eastern Canada. Winter on Pacific and Atlantic Coasts, heading as far south as Brazil.
Identification: A stocky, medium-sized, 25 to 29 cm (9.8 to 11.4 in), sandpiper with a distinct straight dark bill. While in flight, they exhibit a white wedge on their lower back. In winter their plumage is gray overall, and they possess a white lower back and rump, along with a pale eyebrow. Breeding adults are dull cinnamon reddish overall with dark upperparts, and have fine black spotting on their sides and flanks. Short-billed Dowitchers are extremely similar in appearance to Long-billed Dowitchers, and were once thought to be the same species. The latter is larger in size and has a slightly longer bill, but perhaps the most easily distinguishable difference is noted by observing the width of their tail bars while in flight. Pale tail bars are no wider than dark bars for the Short-billed Dowitcher, and pale tail bars are wider than dark bars for the Long-billed Dowitcher.
Life History: Short-billed Dowitchers probe deeply with their long bill into the soil, making rapid up and down movements akin to a sewing machine. They forage on marine worms, snails, tiny crustaceans, and aquatic larvae. Both parents share with incubation of eggs for about 21 days, at which time the female departs while the male takes care of the newly hatched downy young.
Status in Morro Bay area: Seasonally uncommon from late August to early May throughout the Morro Bay Estuary (Beaulieu et al. 2006).
Threats: Breeding habitats seem to be relatively secure, however very small populations are generally susceptible to random environmental events, and migrating birds are vulnerable to potential oil spills. Threats within the Morro Bay area are unknown.

DISTRIBUTION *of* SHORT-BILLED DOWITCHER (*Limnodromus griseus*)

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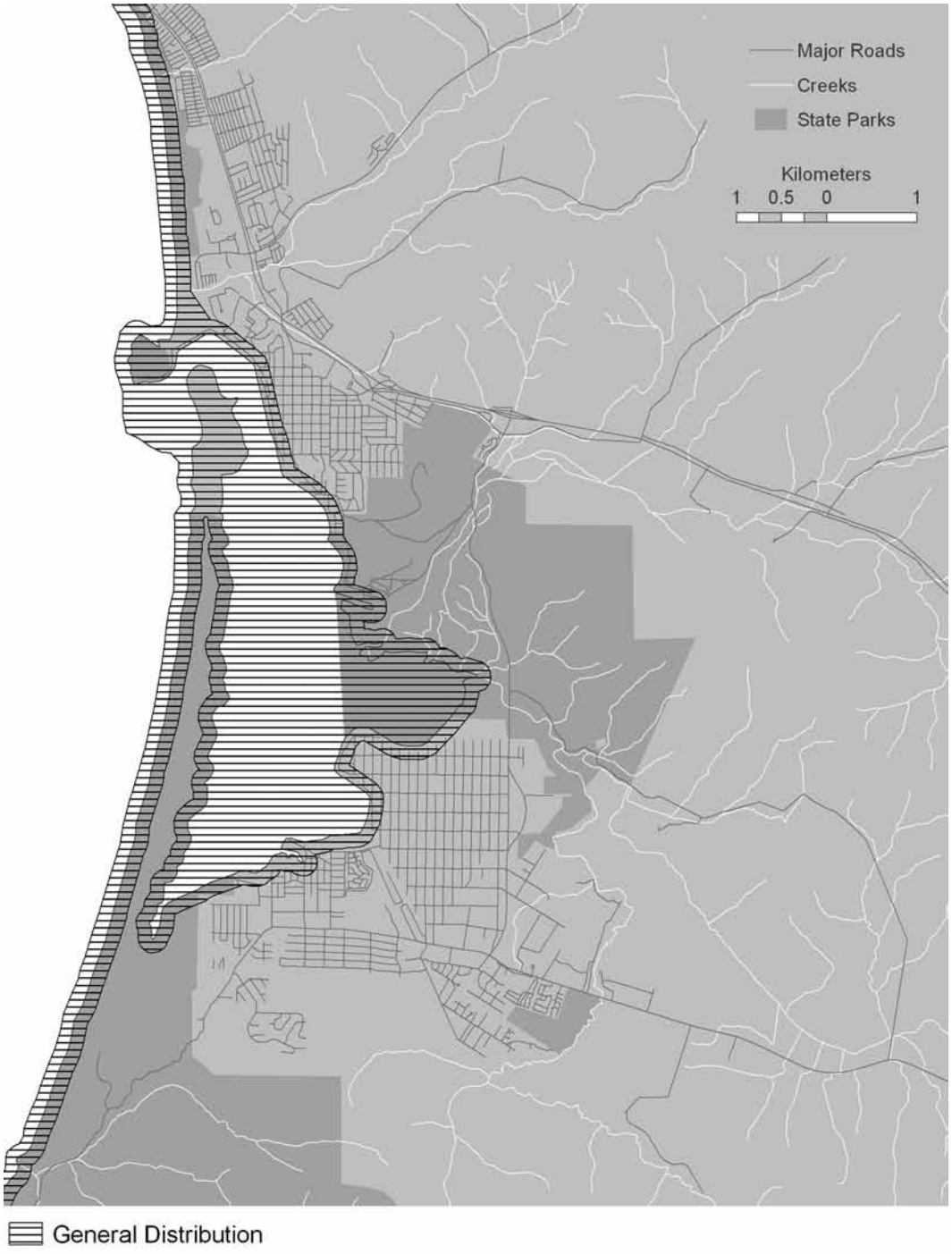
HEERMANN'S GULL
Larus heermanni


Adult Heermann's Gull. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Sensitive Status
Federal: Migratory Bird Treaty Act.
State: None.
Audubon: American Bird Conservancy Rare Yellow List Species; Audubon WatchList Yellow; IUCN Nearly Threatened.

Breeding Period: February to June.
Habitat: Occur along coastal ocean waters usually close to shore including bays, harbors, beaches, offshore islands, lagoons, and coastal creek outfalls.
Nesting: Nest in colonies among boulders on islands in the Sea of Cortez, and have attempted to breed on the Central Coast of California. Site is on level ground, and is either a shallow scrape in soil with very little lining, or a more substantial cup of grasses and weeds lined with feathers. *Clutch Size:* Usually 2 to 3 pale bluish gray to olive eggs that are blotched with brown.
Range: Along Pacific Coast of United States after nesting, returning to Isla Raza on the coast of Mexico to breed.
Identification: A medium sized, 46 to 53 cm (18.1 to 20.9 in), gull that is predominantly dark with a red bill and snowy-white head, which blends into the gray on its back, neck, and rump. Their tail and wings are slate black, with a white band on the tip of the feathers. Non-breeding individuals have a pale gray head, and first winter birds have a very dark gray-brown body and wings.
Life History: The non-breeders of this species are found year-round on beaches, especially here on the Central Coast. They feed mostly on small fish and other marine life, and will often pirate foods from other birds. Steals fish directly from bill pouch of pelicans, and will harass other birds to force them to drop or disgorge their catch. Heermann's Gulls will also take eggs of other birds and scavenge for refuse or carrion, but seem to do less of this compared to some gulls.
Status in Morro Bay area: Common and abundant from June through November on the Morro Bay Estuary and surrounding beaches, rarely seen away from salt water (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Vulnerable to human disturbance on nesting islands, where fisherman sometimes harvest eggs. Heermann's Gulls are particularly at risk because 90-95% of their total world population breeds on one island, Isla Raza. The island was made a wildlife sanctuary in 1964, which has allowed the population to increase since. Current threats to migrating and wintering birds on the Central Coast of California are unknown.

DISTRIBUTION *of* HEERMANN'S GULL (*Larus heermanni*)



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CALIFORNIA GULL
Larus californicus

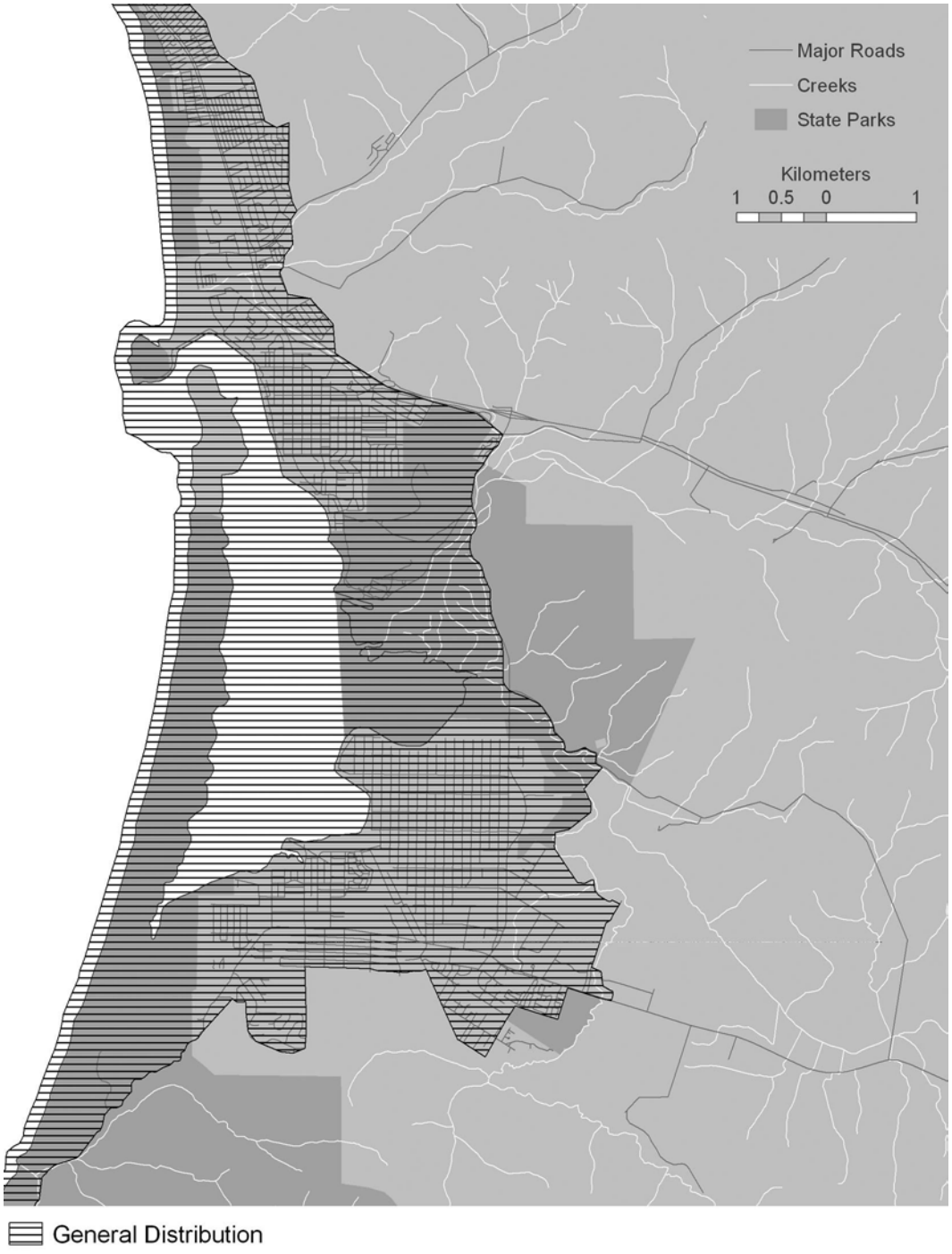
Sensitive Status
Federal: Migratory Bird Treaty Act.
State: G5/S2; Taxa to Watch.
Other: IUCN Least Concern.


California Gull adult. Source: Dr. Lloyd Glenn Ingles © California Academy of Sciences (Used With Permission).


California Gull egg and hatchling. Source: Marguerite Gregory © California Academy of Sciences (Used With Permission).

Breeding Period: May to September.
Habitat: Occurs along seacoasts, estuaries, marshes, lakes, farms, and urban centers. Breeds in the interior on lakes or rivers and winters along coast; frequenting beaches, docks, garbage dumps, and fields.
Nesting: Nest site is on ground near lakes or marshes, often on an island. Nest is built by both male and female and consists of a shallow depression that is usually lined with grass, weeds, feathers, and debris. *Clutch Size:* Usually 2 to 3 (1 to 5) brown, olive, or buff eggs blotched with dark brown or gray.
Range: Breeds in scattered locations from southern Northwest Territories to central California and Colorado; including eastern North Dakota, central Oregon, and San Francisco Bay. Winters along Pacific Coast from southern British Columbia to Mexico, and inland at scattered western localities.
Identification: Similar to Herring Gull, but smaller in size, 47 to 54 cm (18.5 to 21.3 in), and with a darker gray mantle, dark eye, reddish eye ring, and greenish legs. The bill of breeding adults has a red spot overlapped by black. Winter and immature birds have a black sub-terminal bar on their bill and lack the red eye ring of adults. Males and females look alike, with the male being slightly larger than female.
Life History: The California Gull attained fame when it arrived in great numbers at a Mormon colony near Great Salt Lake in Utah and devoured a locust swarm that threatened the settler's first crop. A golden statue of the California Gull in Salt Lake City commemorates the event, and it was made the state bird of Utah. California Gulls forage while walking, wading, swimming, or flying. They may hover and dip down to pick items from the surface of land or water. Like most gulls they are opportunistic feeders, eating anything they can catch or scavenge. Both parents incubate the eggs for 23 to 27 days, and young may leave nest within a few days, but remain in area and are fed by regurgitation from both parents.
Status in Morro Bay area: California Gulls can be seen occasionally throughout the Morro Bay Estuary and surrounding beaches during winter months, and are uncommonly seen during the breeding season (Walgren et al. 2005).
Threats: The California Gull was on the California Department of Fish and Game's list of Species of Special Concern in 1978 and 1992, but was removed from the 2008 list and placed as a "Taxa to Watch". The main threats to the state's breeding population was eliminated by a state water board order in 1994, which will maintain lake levels at Mono Lake; protecting the state's largest colony from ground predators. Current threats to California Gulls within the Morro Bay area are unknown.

DISTRIBUTION *of* CALIFORNIA GULL (*Larus californicus*)



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ELEGANT TERN
Sterna elegans

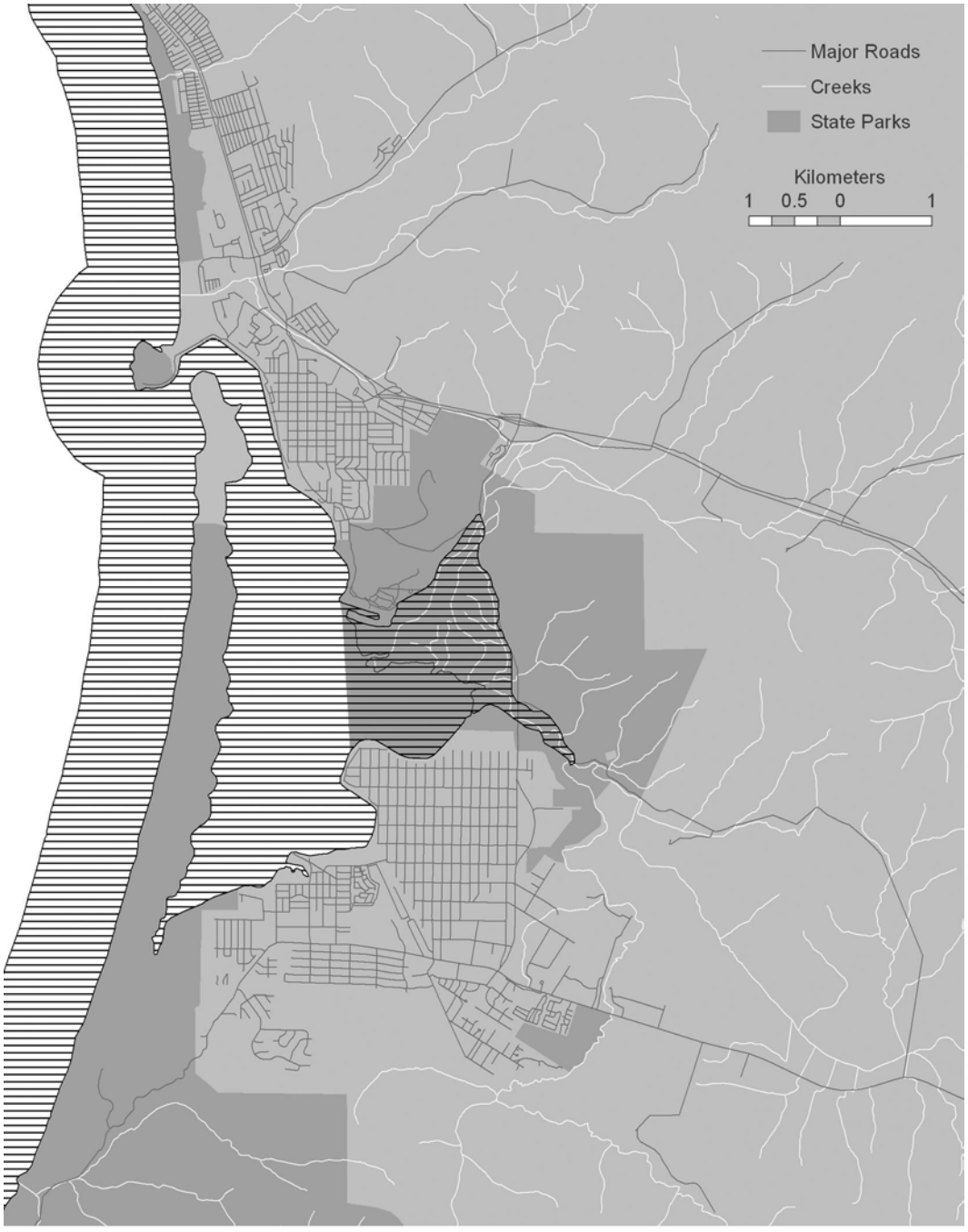

Adult Elegant Tern. Source: U.S. Geological Survey.

Sensitive Status

Federal: Bird of Conservation Concern; Migratory Bird Treaty Act.
State: G2/S1; Taxa to Watch.
Audubon: American Bird Conservancy Rare Yellow List Species; Audubon WatchList Yellow; IUCN Near Threatened.

Breeding Period: July to October.
Habitat: Occurs throughout coast, bays, and beaches. Usually on ocean close to shore over shallow waters, concentrating around bays and estuaries. Sometimes in ocean far from shore and extremely rare on fresh waters inland.
Nesting: Nests on sandy or rocky islands on bare ground. Nest is a simple scrape in the soil and is probably built by both male and female. *Clutch Size:* Usually 1 (2) buff to white eggs that are blotched or spotted with dark brown.
Range: Breeds in southern California and Baja California to Mexico. Moves northward to northern California and British Columbia after breeding. Winters along the Pacific Coast from Mexico to Chile.
Identification: A medium-sized tern, 39 to 42 cm (15.4 to 16.5 in), with a long slender yellow to reddish orange bill that appears to droop down at the tip. They have a white-gray mantle and wings, and a short deeply forked tail. During the breeding season adults have a completely black cap, while in non-breeding winter months their forehead is white. They have a black shaggy crest, and underparts often have a pink blush. Males and females look alike.
Life History: Elegant Terns feed almost entirely on small fish, and occasionally on small crustaceans. In California waters they prey heavily on northern anchovies, and increased populations of anchovies in this area coincides with an increase of Elegant Terns. They forage by hovering over water with bill pointed down, and plunge into water to catch prey below the surface. The nesting of this bird is mostly restricted to Isla Raza, a small flat island in the northern part of the Gulf of California, where it has several colonies of hundreds of nests. In the non-breeding season they migrate north and south for a time before returning back to the island for the next breeding season. They appear to prefer nesting close to the larger Caspian Tern, which may help in defense against predators. Courtship displays are performed on ground, with both members of pair drooping their wings, stretching neck upward, and raising and lowering their bills. Both parents probably carry out incubation, and the incubation period is longer than 20 days. Young may leave the nest after a few days and gather in a group called a "crèche".
Status in Morro Bay area: Typically present on the Morro Bay Estuary and surrounding coastal areas from mid-June through mid-November, and do not winter in San Luis Obispo County (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Elegant Tern breeding grounds have been restricted to only a few colonies compared to at least a dozen in the past. They are highly susceptible to disturbance at their breeding colonies and roost sites from urban development, entanglement in fishing equipment, commercial egging, and the introduction of non-native mammalian predators. Rising temperatures of coastal California seawaters may also affect Elegant Terns in the near future. Increased water temperatures could cause a shift of northern anchovy abundance and distribution, which is the Elegant Terns main source of food. Continual egg harvesting, extensive guano mining, and disruptive tourism are still threats to their largest colony on Isla Raza. Threats to migrants throughout the Morro Bay area are unknown.

DISTRIBUTION *of* ELEGANT TERN (*Sterna elegans*)



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BLACK SKIMMER
Rynchops niger

Sensitive Status

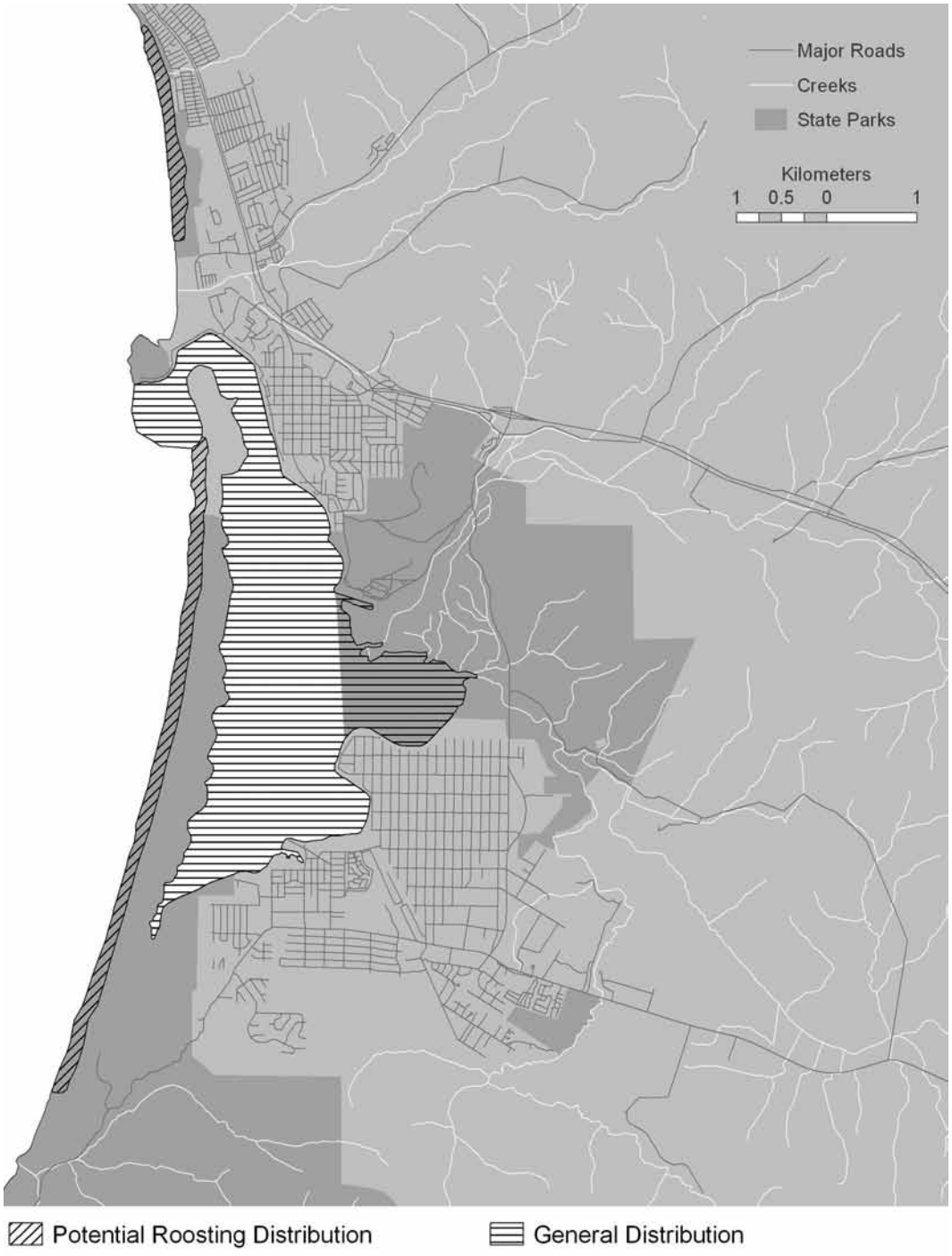
Federal: Bird of Conservation Concern; Migratory Bird Treaty Act.
State: G5/S1S3; Species of Special Concern.
Other: American Bird Conservancy Declining Yellow List Species; Audubon WatchList Yellow; IUCN Least Concern.

Adult Black Skimmer. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Black Skimmer egg and chick. Source: Donna A. Dewhurst, U.S. Fish and Wildlife Service.

Breeding Period: Mid-April to late September.
Habitat: Mostly on open beaches and tidal waters, preferring coastal waters protected from open surf such as estuaries, lagoons, inlets, and sheltered bays.
Nesting: Nest site is on ground of open sandy islands, shell banks, and beaches. Nest is a shallow scrape in the sand as seen in the photo to the right. *Clutch Size:* Usually 4 to 5 (3 to 7) whitish to buff to blue-green eggs that are marked with dark brown.
Range: Winters on the Atlantic Coast from North Carolina south to Florida and along the Gulf Coast west to Texas and south to eastern Mexico, and winters on the Pacific Coast from southern California south to Baja California. Breeds on the Atlantic Coast of North America, and in the Pacific from coastal southern California and the Salton Sea to Ecuador. A few pairs now also nest in central and northern California.
Identification: Black Skimmers are medium-sized to large, 40 to 50 cm (15.7 to 19.7 in), waterbirds that have a large red and black bill, with the lower mandible longer than the upper. They have a black back and cap, and white underparts, and possess very short red legs and long pointed wings. Unlike most birds, their eyes have vertical pupils that are narrowed to slits to cut the glare of water and white sand. Juvenile birds are similar to adults, but have a mottled black-and-white back and head.
Life History: The strange, uneven bill of this bird is for catching fish. It flies low with lower mandible plowing into water, snapping its bill shut when it comes in contact with a fish. They eat mostly small fish that live just below the surface of water, but will also occasionally eat small crustaceans. They find food by touch instead of sight, and often forage in the late evening or at night when waters may be calmer for catching surfacing fish. Black Skimmers breed in colonies, and incubation and feeding of young is by both parents. The upper and lower mandibles of young are the same length at first, enabling them to pick up food dropped on ground by parents.
Status in Morro Bay area: Rare to the Morro Bay Estuary and surrounding areas with transients found throughout the year. Occasionally found roosting along Morro Strand State Beach and likely roosts along portions of the sandspit of Montaña de Oro State Park (T. Edell 2009, pers. comm., 22 Nov.).
Threats: The Black Skimmer was in great decline during the 1970's, however recent evidence suggests that populations have stabilized in much of its range. Current main causes of colony failure are flooding, predation, and human disturbance. Development and increased human and dog traffic on beaches pose major threats to nesting grounds. Even sight disturbances can reduce nesting success, and airplane noise may cause skimmers to frequently take flight early in the season. Off-road vehicles are a major threat on some beaches, and are now required to close during the entire breeding season. Oil and chemical spills, and exploitation on Mexican and Central American wintering grounds also pose threats.

DISTRIBUTION *of* BLACK SKIMMER (*Rynchops niger*)



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MARBLED MURRELET
Brachyramphus marmoratus

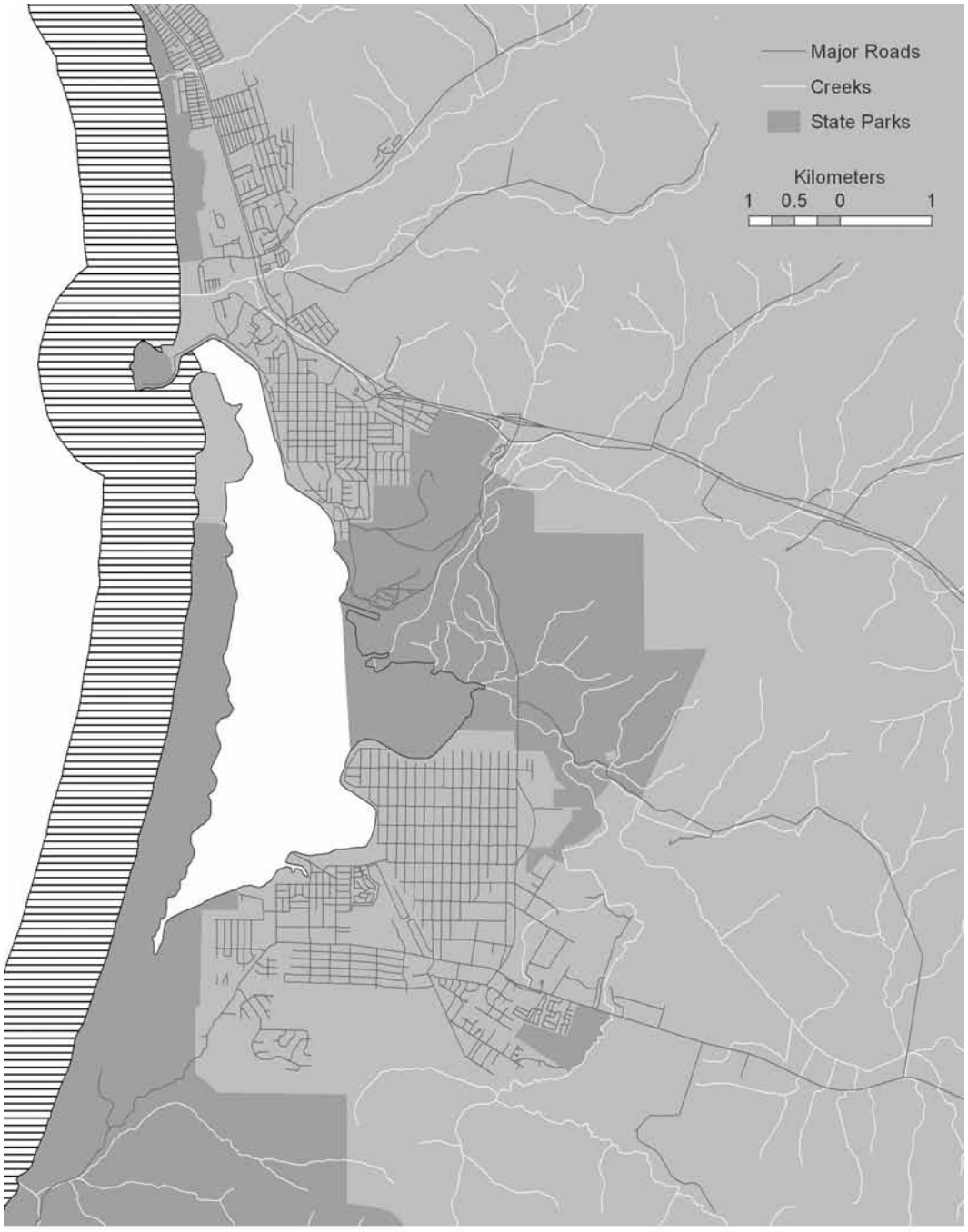

Adult Marbled Murrelet. Source: U.S. Fish and Wildlife Service.

Sensitive Status

Federal: Threatened, October 1, 1992; Migratory Bird Treaty Act.
State: G3G4/S1; Endangered, March 12, 1992.
Other: American Bird Conservancy Declining Yellow List Species; Audubon WatchList Yellow; IUCN Endangered.

Breeding Period: Mid-April to September.
Habitat: Occur in coastal waters and bays, favoring sandy bottoms opposite rocky shores. Sometimes also found on lakes near coast.
Nesting: Nest on mountainsides near coast or well inland up to 24 km (15 miles), on mature conifer forest, particularly in stands of old growth coast redwood and Douglas-fir that are over 200 years of age. They nest solitarily or semi-colonially on a shallow depression of lichen or moss in foliage up to 46 meters (150 feet) above the ground. *Clutch Size:* Only one egg that is variable in color from yellowish to olive to blue-green marked with brown, lavender, and black.
Range: Northern Pacific Coast from Alaska to southern California.
Identification: A small stocky, 24 to 25 cm (9.4 to 9.8 in), seabird that is mottled dark brown with a pale throat and undertail coverts in the breeding season. During the non-breeding season it has a black "helmet" and a white stripe across the scapulars, throat, and underparts. Juvenile birds are similar to non-breeding adults, but are finely flecked with dark on the breast.
Life History: Marbled Murrelets feed mostly on fish and crustaceans while swimming underwater close to shore, in waters less than 30 meters (100 feet) deep. It is usually seen on water in pairs or aggregations of pairs, and not large flocks. Both parents apparently feed young at night, and young leaves nest in about a month, probably flying directly to sea or at least to a lake near the coast.
Status in Morro Bay area: Rare to the area, the Marbled Murrelet has been recorded in the Morro Bay Harbor mouth and near shore at Montaña de Oro State Park (T. Edell 2009, pers. comm., 22 Nov.). In addition to recent sightings, dead oil soaked murrelets were noted on numerous occasions in the 1950's (Carter and Kuletz 1995).
Threats: Habitat loss, oil spills, and offshore gill netting are the three major threats to this species. Populations have had major declines since the 1970's, and in Washington and California declines are now around four to seven percent annually. California populations are thought to be only one-tenth of what they were in the 1950's, mostly due to logging and development of their forested nesting areas. Current threats to Marbled Murrelets within the Morro Bay area are unknown.

DISTRIBUTION *of* MARBLED MURRELET (*Brachyramphus marmoratus*)



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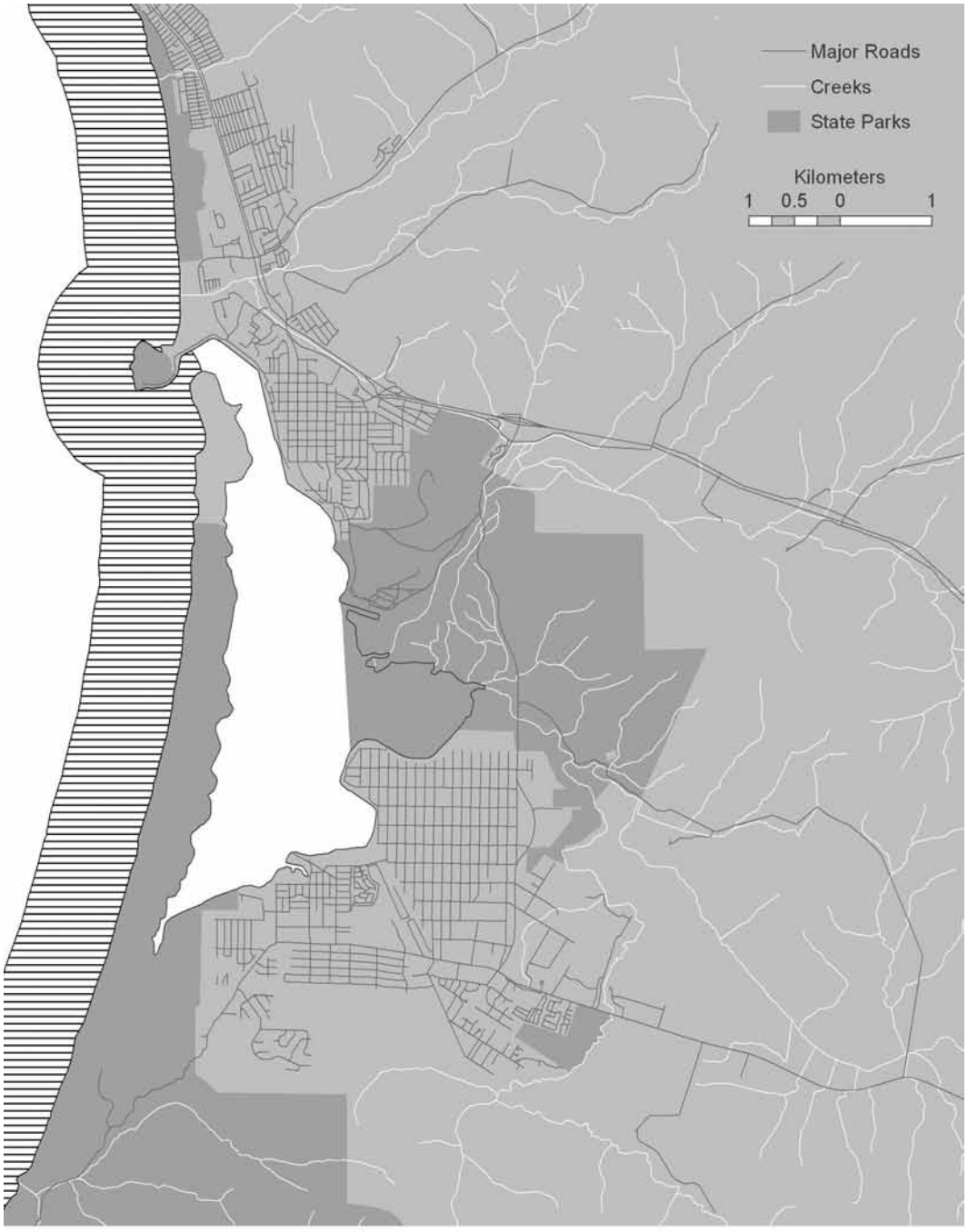
ANCIENT MURRELET
Synthliboramphus antiquus


Adult Ancient Murrelet. Source: Birdfinders, www.birdfinders.co.uk/news/kamchatka 2007pics.htm.

Sensitive Status
Federal: Migratory Bird Treaty Act.
State: None.
Other: American Bird Conservancy Declining Yellow List Species; Audubon WatchList Yellow; IUCN Least Concern.

Breeding Period: June to August.
Habitat: Mostly pelagic, occurring on cool open ocean and inshore coastal waters, only occasionally in harbors and protected bays.
Nesting: Breed and nest on islands in colonies that are mostly active at night. Nest site is a burrow in ground under trees or grass, typically on a slope and close to sea. The burrow is excavated by both parents and is usually 61 to 152 cm (2 to 5 feet) long with a chamber at the end that is lined with twigs, grass, and leaves. *Clutch Size:* Usually 2 (1) pale buff to olive eggs that are spotted with brown.
Range: Breeds in British Columbia, Alaska, and northeast Asia. Spend winter months off the northern Pacific Coast from southern Alaska to California.
Identification: Ancient Murrelets are a small, 20 to 24 cm (7.9 to 9.4 in), and compact alcid with a very short, dark-tipped yellowish bill. They have a gray back and bright white wing linings. Breeding adults have a black crown, chin, throat, nape, and sides, with white streaks on the crown and nape. Non-breeding birds lack the bold white streaking on the crown and gray replaces black on the sides. Juveniles are similar to non-breeding adults, but lack the black throat and some black streaking on the chin.
Life History: Ancient Murrelets feed on crustaceans and fish, preferring euphausiid shrimp of about 2.5 cm (1 inch) long throughout most of the year. They forage while swimming underwater, probably catching all food within about 18 meter (60 feet) of the surface. During the breeding season, males come ashore after dark and sing a simple song of repeated chirps from a high perch. Both parents carry out incubation and feeding of young, and young are not fed in the nest, leaving to the sea in 1 to 3 days after hatching. They reunite with their parents in the sea by recognizing each other's voice, and swim away from the colony together.
Status in Morro Bay area: Rare to the area, Ancient Murrelets are occasionally seen in near shore waters of Montaña de Oro State Park and off Morro Bay North Jetty (T. Edell 2009, pers. comm., 22 Nov.). They have been spotted during the Morro Bay Winter Bird Festival from boat trips out of Avila for four years within the past decade; 2003, '04, '07, and '09.
Threats: Introduced mammals such as Red Foxes, raccoons, and rats have wiped out or reduced nesting populations on many islands throughout North America and northeast Asia. Removal programs have led to rapid recovery in some cases, but repeated recolonization by raccoons in British Columbia remains to be the most pressing conservation issue for Ancient Murrelets today. Current threats to Ancient Murrelets within the Morro Bay area are unknown.

DISTRIBUTION *of* ANCIENT MURRELET (*Synthliboramphus antiquus*)



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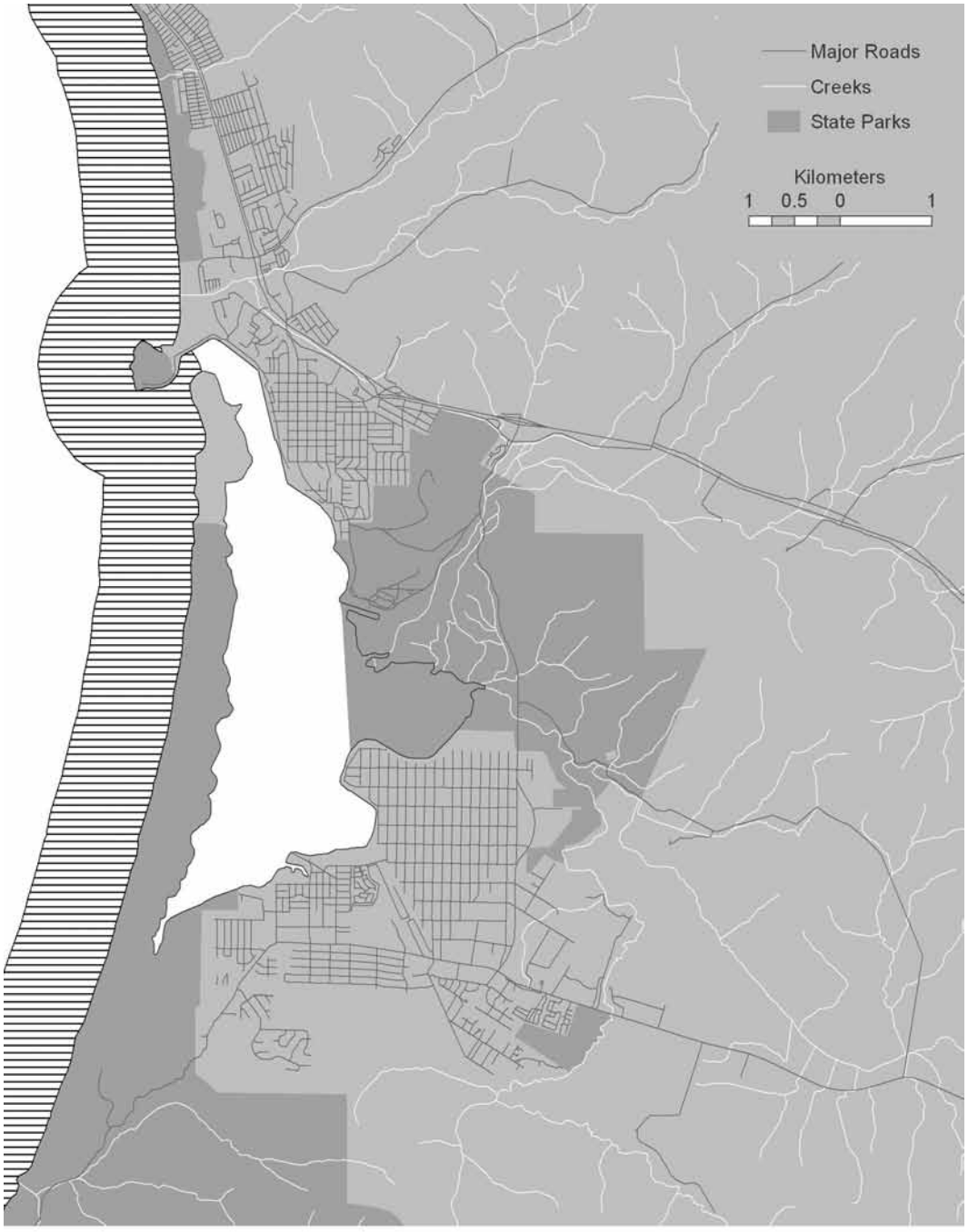
CASSIN'S AUKLET
Ptychoramphus aleuticus


Cassin's Auklet on Farallon Islands. Source: Duncan Wright 2003 (Used With Permission).

Sensitive Status
Federal: Bird of Conservation Concern; Species of Concern; Migratory Bird Treaty Act.
State: G4/S2S4; Species of Special Concern.
Other: IUCN Least Concern.

Breeding Period: January to August.
Habitat: Breeds on offshore islands and grassy sea stacks. Otherwise on open waters, usually over upwellings along the continental shelf, but also far out to sea over deep water.
Nesting: Nest site is in a burrow excavated in soil or in a natural crevice, which is sometimes under debris or driftwood and has little or no nest material added. Nests are excavated by both male and female, and are reused in following years by the same pair. *Clutch Size:* Only one creamy white egg that sometimes becomes nest-stained.
Range: Occurs along the Pacific Coast, nesting on islands from Alaska to Mexico.
Identification: This very small, 23 cm (9.1 in), plump seabird is easily distinguished from its alcid relatives by having rounded wing tips and a gray neck and underwings, which are displayed in flight. They have bold white crescents above and below their yellow eye, and a dark bill which is pale at the base of the lower mandible. Upperparts are dark sooty-gray that fade to paler gray on the sides, throat, flanks, breast, and underwings. Their undertail coverts and belly are white.
Life History: Cassin's Auklets feed mostly on small crustaceans while swimming under water, and can dive to more than 36 meters (120 feet). They are the only alcid known to have up to two broods in a single breeding season. Courtship displays include mutual bowing and head bobbing, touching bills, and moving head from side to side. Both parents carry out feeding of young at night by regurgitation.
Status in Morro Bay area: Uncommon visitor from mid-September to mid-April, primarily found well offshore. Although a Cassin's Auklet has been seen in the Morro Bay Harbor mouth once, they are not expected on the estuary or in the bay, and are primarily a species of open ocean. It has only been recorded on the Morro Bay Christmas Bird Count 12 times because it usually occurs farther offshore than the count circle (T. Edell 2009, pers. comm., 22 Nov.).
Threats: The Cassin's Auklet is still abundant in some parts of its range, but has disappeared from many former breeding islands in Alaska and elsewhere due to introduced foxes and other predators. They are also threatened by oil spills and contaminates, introduced plants, increased predation rates in response to artificial lights, and human disturbance. Current threats to Cassin's Auklets within the Morro Bay area are unknown.

DISTRIBUTION *of* CASSIN'S AUKLET (*Ptychoramphus aleuticus*)



Sources:

Adams, J. 2008. Cassin's Auklet (*Ptychoramphus aleuticus*). Pp. 205-212 in W.D. Shuford and T. Gardali (eds.), California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

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RHINOCEROS AUKLET
Cerorhinca monocerata

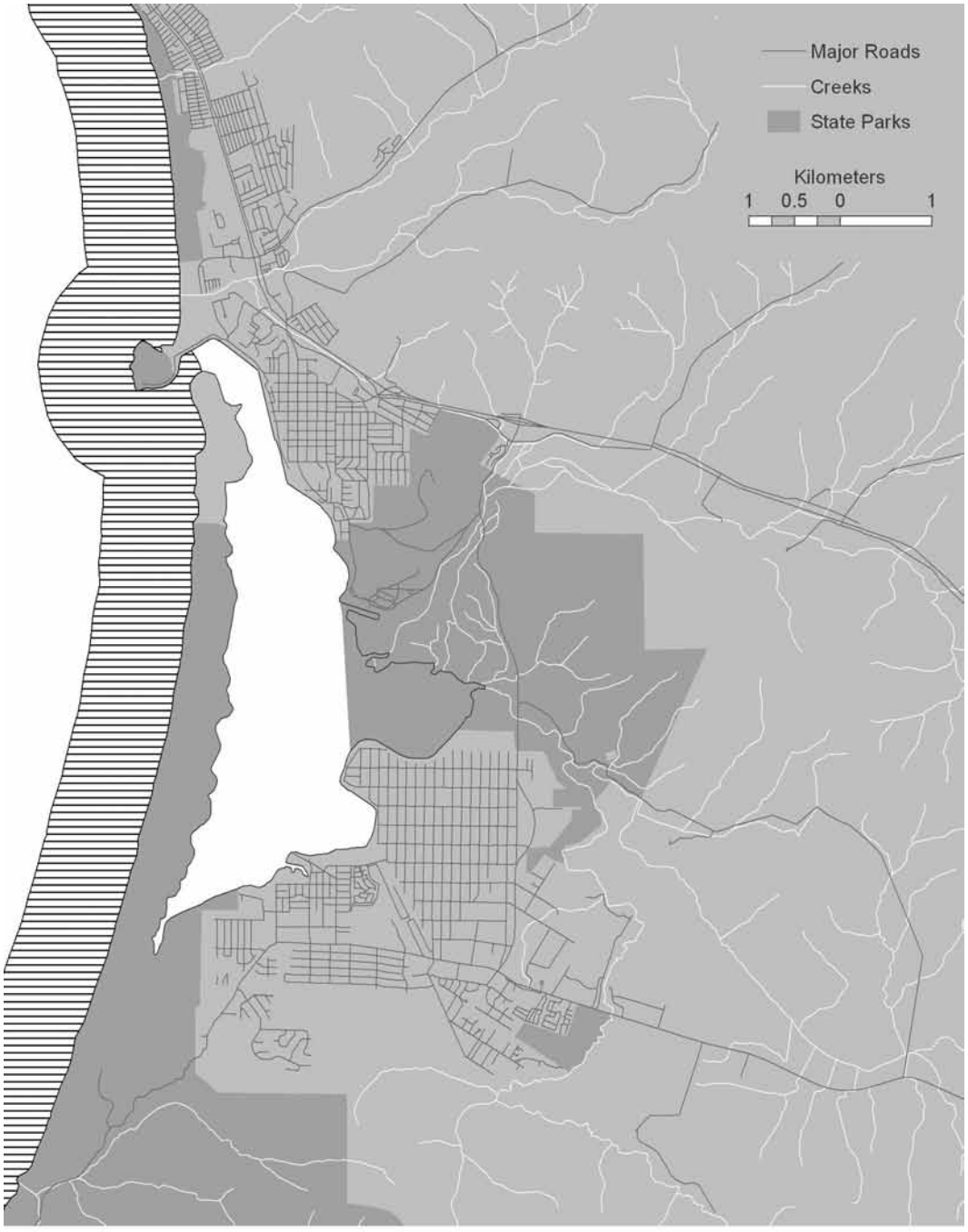

Rhinoceros Auklet. Source: Wikimedia Commons (http://commons.wikimedia.org).


Rhinoceros Auklet. Source: Wikimedia Commons (http://commons.wikimedia.org).

Sensitive Status
Federal: Migratory Bird Treaty Act.
State: G5/S3; Taxa to Watch.
Other: IUCN Least Concern.

Breeding Period: February to June.
Habitat: Mostly pelagic; breeding on offshore islands, islets, and sea cliffs. Forage along inshore coastal waters and offshore open ocean. Wintering birds may spend night on coastal bays, flying out to sea to forage by day.
Nesting: Nest colonially, mostly on islands with enough soil for creating burrows. Nest sites are in ground, typically on a slight slope covered with grass, shrubs, and trees. Burrows are usually 1.5 to 3 meters (5 to 10 feet) long, but can up to 6 meters (20 feet). The nest is located in a chamber of the burrow, and consists of a cup made of moss and twigs. *Clutch Size:* Only one white egg that is usually spotted with brown and gray.
Range: Occur along the northern Pacific Coast from Alaska to southern California.
Identification: A medium sized, 28 to 29 cm (11 to 11.4 in), chunky dark seabird with grayish upperparts and breast, and a whitish belly. They have stout, pale-yellowish bills, yellowish eyes, and a short thick neck. Breeding males and females have a fleshy yellowish "horn" at the base of the bill and two white plumes originating from behind the eye and behind the bill. The "horn" grows annually in early spring and is shed in late summer.
Life History: Rhinoceros Auklets feed on fish and crustaceans, favoring fish that gather in dense schools. They may tend to forage closer to shore than puffins, and swim underwater for up to two minutes to catch food. Incubation and feeding of young is carried out by both parents, which carry fish in bill to nest.
Status in Morro Bay area: Rarely recorded in the Morro Bay harbor, Rhinoceros Auklets are uncommon near shore along Morro Strand State Beach and Montaña de Oro State Park (T. Edell 2009, pers. comm., 22 Nov.). They can occasionally be seen foraging throughout coastal waters of the Morro Bay area during winter, typically from November to March (Beaulieu et al. 2006).
Threats: Threatened mostly by the introduction of non-native species on their nesting islands. Rhinoceros Auklets ceased to breed for almost a century on the Farallon Islands of California, until introduced rabbits were eliminated in the 1970's. The rabbits are thought to have competed for Rhinoceros Auklet nesting burrows. Current threats to Rhinoceros Auklets within the Morro Bay area are unknown.

DISTRIBUTION *of* RHINOCEROS AUKLET (*Cerorhinca monocerata*)



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WESTERN BURROWING OWL
Athene cunicularia


Western Burrowing Owl. Source: California Department of Fish and Game 2009.

Sensitive Status

Federal: Bird of Conservation Concern; Species of Concern; Migratory Bird Treaty Act.
State: G4/S2; Species of Special Concern.
Other: Bureau of Land Management Sensitive Species; IUCN Least Concern; CITES II.

Breeding Period: March to August.
Habitat: Typically found in open grasslands, prairies, farmland, and airfields. Also seen along road cuts and other, generally open areas.
Nesting: Usually nest in abandoned burrows of other small animals, although they may dig their own burrow in soft soil or use artificial structures. The nest chamber is lined with excrement, pellets, grass, feathers, and other debris, but is sometimes unlined. *Clutch Size:* Usually 5 to 6 (2 to 10) white, smooth and glossy eggs that are 31 x 26 mm in size.
Range: From southwestern Canada, western U.S., Florida, and northern Alaska. Occur throughout suitable habitat in California, from the coast to 1,615 meters (5,300 feet) in Lassen County. More northern owls may winter to the south as far as Central America, but are mostly residents in California.
Identification: A small owl, 23 to 28 cm (9 to 11 in), with long legs and a short tail. Adults are boldly spotted and barred, and juvenile is buffy below. Males tend to be paler in color than females. Western Burrowing Owls have rounded heads with no ear tufts, yellow eyes and whitish eyebrows, and a white chin stripe. When agitated, the head bobs or they bow with a quick bending motion of the legs, and they send an alarm call that mimics a rattlesnake.
Life History: Western Burrowing Owls are mainly nocturnal, but can occasionally be seen during day (especially dusk and dawn). They are social owls that may be seen in groups preying on insects, small mammals, reptiles, birds, and carrion. Usually hunt at dusk and night, but are known to hunt at day during the breeding season. They hunt by a variety of methods including swooping down from a perch, hovering in the air and displaying hawk-like dives, as well as hopping along the ground and clutching prey in their talons. Males conduct courtship displays in front of the burrow and peak breeding occurs in April and May. Young emerge from their burrow at about two weeks and fly by about the fourth week. Some of their predators include falcons, hawks, golden eagles, foxes, coyotes, and domestic pets.
Status in Morro Bay area: In coastal areas of San Luis Obispo County, Western Burrowing Owls are rare winter residents from October to March. They forage and occasionally roost in burrows along the coast, however do not nest (Walgren et al. 2008). Roosting locations vary from year to year and they have occasionally been recorded along Turri Road and have also wintered at the base of the South Jetty (T. Edell 2009, pers. comm., 22 Nov.). In addition, there have been recent sightings along Morro Creek (M. Walgren 2009, pers. comm.).
Threats: Numbers have been markedly reduced in California for at least the past 60 years. Conversion of grasslands to agriculture, other habitat destruction, and poisoning of ground squirrels has contributed to the reduction in numbers in recent decades. However, within the past 20 years, and particularly within the past 5 years, the decline in California appears to have greatly accelerated, apparently due to habitat loss caused by development. The introduction of domestic dogs and cats may also be a factor in their decline.

DISTRIBUTION *of* WESTERN BURROWING OWL (*Athene cunicularia*)

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CALIFORNIA SPOTTED OWL
Strix occidentalis occidentalis


California Spotted Owl adult. Source: U.S. Fish and Wildlife Service.

Sensitive Status

Federal: Bird of Conservation Concern; Partners in Flight WatchList; USDA Forest Service Sensitive Species; Migratory Bird Treaty Act.
State: G3T3/S3; Species of Special Concern.
Other: American Bird Conservancy Red List Species; Audubon WatchList Red; Bureau of Land Management Sensitive Species; IUCN Near Threatened.

Breeding Period: March to August.
Habitat: Prefers old-growth coniferous and mixed conifer-hardwood forests. Along the Pacific seaboard it is mainly in undisturbed old-growth timber, including Douglas-fir and redwoods. In the southwest it is generally in forest mountains and canyons, especially near tall trees that are close to rocky cliffs.
Nesting: They choose a sheltered site inside a large hollow tree, broken treetop, abandoned stick nest, or a cave or cliff crevice. No nest is built and they create a simple scrape in debris at the bottom of their site. *Clutch Size:* Usually 2 (1 to 3) white to pearl gray eggs.
Range: Occur from the southern Cascade Range of northern California to the west slope of the Sierra Nevada, and in mountains of central and southern California nearly to the Mexican border.
Identification: A large owl, 47 to 48 cm (18.5 to 18.9 in), with a round head and no ear tufts. Spotted Owls are chocolate brown in color with white-tipped feathers that give them a mottled look. They have dark eyes and an indistinct, creamy blaze on the center of their upper breast. The California Spotted Owl is lighter brown than the Northern Spotted Owl, and has larger spots.
Life History: Spotted Owls mostly eat small forest mammals and specialize on woodrats, deer mice, voles, small rabbits, and bats. Also occasionally eat small birds, reptiles, and large insects. They mostly hunt at night, but also by day during nesting period. They usually hunt by watching from a perch, then swoop out to capture prey in their talons. Pairs typically use the same nest site for life, but often do not nest every year, with some not breeding for periods of up to five or six years time. Males defend nesting territory by calling at dusk and night, and feed females during incubation.
Status in Morro Bay area: An uncommon winter resident throughout preferred habitat within the Morro Bay area. There is only one documented record of the California Spotted Owl in the area, located in northern Irish Hills of San Luis Obispo County in 1984. Other sightings are documented throughout the Irish Hills and scattered throughout San Luis Obispo County (CNDDB 2009).
Threats: The primary threat to the California Spotted Owl is habitat loss and degradation due to timber harvesting, large stand-destroying wildfires, and residential development. Its specialized habitat requirements, low reproductive rate, deferred reproductive maturity, and limited dispersal ability makes it particularly vulnerable to habitat changes. In the Sierra Nevada, catastrophic fires are occurring with greater frequency, mostly due to fire suppression, and increasing residential development; both of which are reducing the breeding habitat for some owls and winter habitat for down slope migrants. Another threat to the California Spotted Owl is the resent invasion of its range by the Barred Owl (*Strix varia*). Barred Owls negatively affect the reproduction and survival of Spotted Owls by displacement, physical attack, and possible death.

DISTRIBUTION *of* CALIFORNIA SPOTTED OWL (*Strix occidentalis occidentalis*)

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ALLEN'S HUMMINGBIRD
Selasphorus sasin

Sensitive Status

Federal: Partners in Flight WatchList; Migratory Bird Treaty Act.
State: G5/SNR.
Other: American Bird Conservancy Rare Yellow List Species; Audubon WatchList Yellow; IUCN Least Concern; CITES II.

Adult Allen's Hummingbird. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Breeding Period: March to June.
Habitat: Wooded or bushy canyons, parks, gardens, and mountain meadows. Breeds in riparian scrub, riparian woodland, and coast live oak woodland, as well as ornamental plantings in parks and residential areas.
Nesting: Nesting sites are typically low on trees or shrubs on horizontal or diagonal branches. Nest is a cup of plant fibers and green mosses lined with fine plant down. The outside is typically camouflaged with lichens held together by spider webs. Nests are built by females only and may be reconditioned and reused. *Clutch Size:* Usually 2 white eggs.
Range: Breeds along the Pacific Coast from southern Oregon to southern California. Winters in Mexico and is occasional vagrant to eastern United States.
Identification: A tiny, 9 cm (3.5 in), and compact bird that is similar in size and shape to Anna's Hummingbird. They are orange on the belly and tail, and their outer tail feathers are rather narrow. Males of this species have an iridescent red throat and shiny green back. Females have white throats with a few red feathers and green on their back and head.
Life History: These birds feed off nectar from flowering plants while hovering. They favor red tubular flowers such as red monkey-flower, penstemon, red columbine, and paintbrush species. They also occasionally feed on small insects and tree sap. During courtship, males display a J-shaped flight pattern by flying high in the air, then curving up to hover at a moderate height. This is often preceded by back-and-forth pendulum flight in front of the female. Allen's Hummingbirds are often confused with the Rufous Hummingbird and the amount of orange on the back is a distinction between the two.
Status in Morro Bay area: Allen's Hummingbird is a common spring transient and summer resident along the coast. It is fairly common in late summer, becoming rare by early fall. Breeding adults have been documented at many locations and they are commonly found nesting in trees and undergrowth of riparian and coast live oak woodland. Allen's Hummingbirds can also be found nesting in residential areas and in ornamental plantings of parklands (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Potential threats include habitat loss, increased use of pesticides, and replacement of native plants by invasive species. Their restricted breeding and wintering range makes them more susceptible to natural disasters, diseases and/or land use changes. Partners in Pollination was formed in 1995 to increase awareness of the importance of pollinators to ecosystems, and have encouraged research and conservation efforts for birds of this kind.

DISTRIBUTION *of* ALLEN'S HUMMINGBIRD (*Selasphorus sasin*)

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OLIVE-SIDED FLYCATCHER
Contopus cooperi

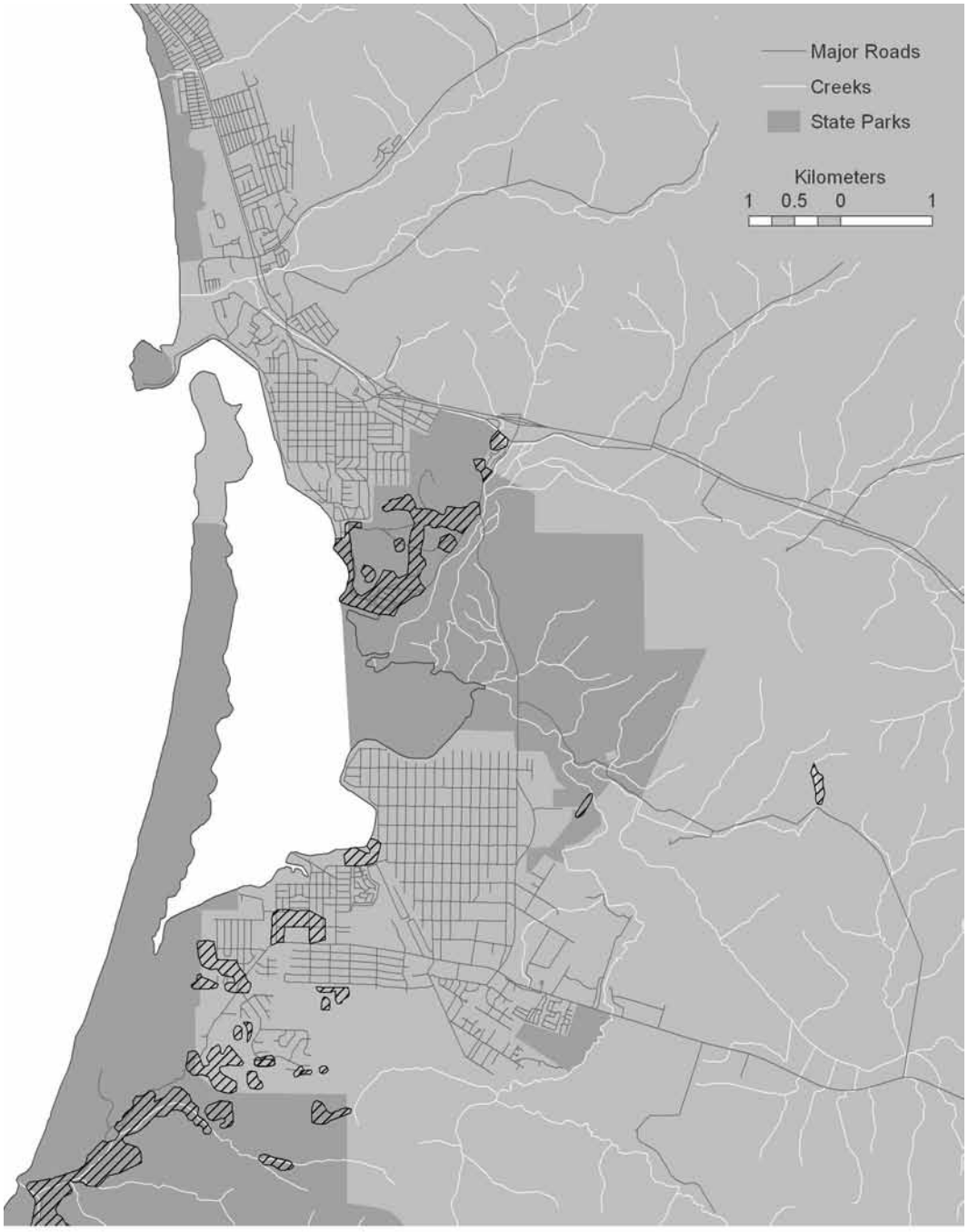

Olive-sided Flycatcher. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Sensitive Status

Federal: Bird of Conservation Concern; Species of Concern; Partners in Flight WatchList; Migratory Bird Treaty Act.
State: G4/S4; Species of Special Concern.
Audubon: American Bird Conservancy Declining Yellow Species; Audubon WatchList Yellow; IUCN Near Threatened.

Breeding Period: Early May to late August.
Habitat: Occurs in coniferous forest, burns, and clearings. Breeds in extensive montane and northern coniferous forest stands, especially at edges and openings such as bogs, ponds, and meadows. Spends winter in a wide variety of habitats, typically at forest edges and clearings with full-crowned trees. Frequently associated with burned forest
Nesting: Nest site is in a tree, usually on a horizontal branch well far out from the trunk. They build a flat open cup of twigs and plant fibers bound together with spider silk and lined with finer materials. *Clutch Size:* Almost always 3 (2 to 4) white to pinkish buff eggs with brown and gray spots concentrated on the larger end.
Range: Breeds throughout western North America north to Alaska, and throughout much of Canada. Also nests near the coast in California. Winters mostly in South America, with a few in Central America.
Identification: A large, 18 to 20 cm (7.1 to 7.9 in), and sturdy flycatcher with a dark olive-gray "vest", and light throat and belly. They have white rump patches and a large, dark bill. The Western Wood-Pewee is similar in appearance, but is smaller in size and lacks white rump tufts.
Life History: Olive-sided Flycatchers apparently feed entirely on flying insects and especially bees. They forage by watching from a high, exposed perch, flying out to catch insects in the air, and then returning to their perch to eat. Males aggressively defend nesting territories by singing persistently. The female carries out incubation, and if flushed off the nest she will often drop to the ground without flying.
Status in Morro Bay area: Olive-sided Flycatchers are very uncommon local breeders that nest in stands of eucalyptus throughout the Morro Bay area (T. Edell 2009, pers. comm., 22 Nov.). They are summer residents and migrants mainly from mid-April to early October, with a breeding season in California from early May to late August (Widdowson 2008). Nesting sites within the area include eucalyptus stands at Sweet Springs Nature Preserve, Morro Bay and Montaña de Oro State Parks, as well as scattered stands throughout the town of Los Osos (CDPR staff).
Threats: The Olive-sided Flycatcher has been declining throughout much of its range for many years, particularly within recent decades. Degradation and loss of habitat is the most significant threat to this species. Much of its wintering habitat has been lost to poor logging practices and development. Fire suppression may be a threat to there nesting habitat as well, as they may depend on forest fires and other natural disturbances that create patchy habitats, forest openings, and abundant forest edge in which they prefer.

DISTRIBUTION *of* OLIVE-SIDED FLYCATCHER (*Contopus cooperi*)



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WILLOW FLYCATCHER
Empidonax traillii


Willow Flycatcher. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Sensitive Status

Federal: Partners in Flight WatchList; USDA Forest Service Sensitive Species; Migratory Bird Treaty Act.
State: G5/S1S2; Endangered, January 2, 1991.
Other: American Bird Conservancy Declining Yellow List Species; Audubon WatchList Yellow; IUCN Least Concern.

Breeding Period: Early June to late August.
Habitat: Occur in riparian woodlands, stream thickets, rivers, floodplains, springs, and moist mountain meadows. Can be found in almost any habitat type during migration.
Nesting: Nest in a deciduous shrub or tree, usually placed in a vertical or diagonal fork of a willow (*Salix* spp.) branch. The female builds an open cup nest of grass and plant fibers, lined with plant down and softer materials. *Clutch Size:* Usually 3 to 4 (5) pale buff to whitish eggs with brown spots concentrated toward the larger end.
Range: Occurs throughout much of the United States during the summer breeding season. Migrate throughout Central America, wintering along the western coast of Central America and northwestern South America. They are rare to locally uncommon summer residents in wet meadows and montane riparian habitats in the Sierra Nevada and Cascade Range of California. Some may still nest elsewhere in lowland California such as San Diego County, but records are scarce and not definitive.
Identification: A small, 13 to 17 cm (5.1 to 6.7 in), flycatcher with olive-brown upperparts, a yellowish belly, and a pale olive breast. They have two whitish wing bars, a white throat, and no eye ring. Willow Flycatchers are distinguishable from other flycatchers by lacking the fully discernable pale eye rings of other species.
Life History: Willow Flycatchers are the latest of all spring migrants in California with the exception of the nighthawk and Black Swift. They were once lumped with the Alder Flycatcher as one species, the Traill's Flycatcher. Adults usually forage from perches within tall shrubs or low trees by flying out to catch insects in midair or hovering to take insects from foliage. Incubation is by female for 12 to 15 days and both parents bring food for nestlings, which take their first flight at about 12 to 14 days.
Status in Morro Bay area: Uncommon spring migrant from mid-May to early June, and fall migrant from late August to mid-October in a variety of habitats throughout the area (T. Edell 2009, pers. comm., 22 Nov.; CDPR staff).
Threats: Loss of willow habitat and livestock overgrazing are the main threat to this species. Overall populations appear to be declining and there is estimated to be only 200 breeding pairs left in California. Large flood control damns may also adversely affect nesting success, as Willow Flycatchers will not attempt to nest in the absence of flowing water. The southwestern and little willow subspecies (*E. traillii extimus* and *E. traillii brewsteri* respectively) are also listed as threatened in California, and have been extirpated from much of their original range.

DISTRIBUTION *of* WILLOW FLYCATCHER (*Empidonax traillii*)

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LOGGERHEAD SHRIKE
Lanius ludovicianus


Adult Loggerhead Shrike. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Sensitive Status
Federal: Bird of Conservation Concern; Migratory Bird Treaty Act.
State: G4/S4; Species of Special Concern.
Other: IUCN Least Concern.

Breeding Period: January or February to July.
Habitat: Occur in open country adjacent to dense brush including oak woodland, savannah, pinyon-juniper woodland, and sagebrush plains. Also appear on ranch land and some suburbs.
Nesting: Nest is a solid bulky cup of twigs and vegetation lined with softer materials. Both adults build nest in a tree or shrub usually 1.5 to 9 meters (5 to 30 feet) above the ground. *Clutch Size:* Varies in size, but often 4 to 7 (up to 9 in Alaska) pale gray or greenish white eggs that are spotted with brown, olive, and gray.
Range: Breeds in southern Canada, and widely throughout the United States except portions of the Northwest, Northeast, and higher elevations. Winters throughout most of the United States, southern Canada, and much of Mexico.
Identification: Loggerhead Shrikes are small, 20 to 23 cm (7.9 to 9.1 in), and share the same coloration and many of the same markings as the Northern Mockingbird, but differ greatly in their diet and hunting abilities. They have a black tail and wings, gray crown and back, and an extensive black mask that extends above their all-dark, hooked bill. Their underparts are white, and they have barred flanks. In flight they have white wing patches and a white-edged tail. Juvenile birds have gray barring on the crown, back, rump, and underparts.
Life History: Loggerhead Shrikes forage mostly by watching from an exposed perch, then swoop down to take prey on or near the ground, or from low vegetation. They feed mostly on large insects, but also rodents, small birds, small reptiles and amphibians, and occasionally carrion. They kill prey by using their hooked bill, and often store uneaten prey by impaling it on thorns or barbed wire, returning to eat it later. Both parents feed nestlings, which leave the nest at about 17 to 21 days old, but are still tended to by parents for three weeks to a month.
Status in Morro Bay area: Loggerhead Shrikes are a common winter visitor and uncommon to rare local breeder along the coast of San Luis Obispo County (T. Edell 2009, pers. comm., 22 Nov.). They occur in coastal scrub and open country throughout the Morro Bay area (CDPR staff), and based on breeding birds of the Oceano Dunes, the coastal dune scrub habitat along the sandspit would appear to be potential winter and breeding habitat (T. Edell 2009, pers. comm., 22 Nov.).
Threats: Numbers have declined in many areas during recent decades, and they are now essentially gone from their northeastern range. Reasons for their decline are poorly understood, but are most likely related to habitat loss from agriculture and urbanization on their breeding and wintering grounds along with migratory routes. Another likely threat is habitat conversion caused by exotic grasses and forbs that were introduced by livestock grazing. Invasive plants such as cheat grass (*Bromus tectorum*) often alter fire regimes by increasing fire frequency and sagebrush loss; ultimately converting scrubland habitat to grassland. Pesticides are another likely cause of population decline, as shrikes have a diet of pure animal matter. However, most evidence of pesticide use as a threat to shrikes is circumstantial, and exact impacts are still unknown.

DISTRIBUTION *of* LOGGERHEAD SHRIKE (*Lanius ludovicianus*)

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PURPLE MARTIN
Progne subis


Purple Martin adult male. Source: J.J. Cadiz 2008 (Used With Permission).

Sensitive Status
Federal: Species of Concern; Migratory Bird Treaty Act.
State: G5/S3; Species of Special Concern.
Other: IUCN Least Concern.

Breeding Period: April to August, with peak activity in June.
Habitat: Occur in semi-open country near water, towns, farms, and mountain forest. Breeds in riparian woodlands and mixed montane forest.
Nesting: Nest in loose colonies or as isolated pairs. Nest site is a cavity in tree; typically form old woodpecker holes (or giant cactus in southwest), and may also nest in holes on buildings or cliffs. Nest is a cup of grass, leaves, twigs, and usually mud. The nest is built by both sexes and may have a raised dirt rim in front of it to help keep eggs from falling out. *Clutch Size:* Usually 4 to 5 (3 to 8) white eggs.
Range: Somewhat common to central and eastern United States, migrating to South America for winter. Occurs in scattered locations throughout northern California, and a few locations along the Central Coast and southern California.
Identification: A large, 19 to 20 cm (7.5 to 7.9 in), swallow with a dark blue, glossy body. Purple Martins have a slightly forked tail, broad pointed wings, and a small bill. Males are bluish-black throughout, while females have a prominent whitish collar, an extensive whitish forehead, and are dingy gray to brown below with smudgy markings.
Life History: Purple Martins feed on a wide variety of flying insects and forage almost entirely in the air. Some Native American tribes hung hollow gourds to serve as nesting sites for these birds to control insect populations, and almost all Purple Martins in the east now nest in birdhouses set in place for the same reason. In spring, males return to nesting sites first to establish territory. Females incubate eggs and both parents feed nestlings until they leave the nest in about a month's time.
Status in Morro Bay area: Rare migratory visitor throughout the Morro Bay area. Known to nest in western sycamore (*Platanus racemosa*) woodland in a few locations of San Luis Obispo County, however there are no recorded nest sites within the Morro Bay area (Airola and Williams 2008).
Threats: Purple Martins have declined seriously in parts of western United States, and are currently declining in the east as well. Loss of suitable nesting crevices and snags through fire suppression and logging has diminished populations. Competition with starlings for nest sites is the main threat to remnant martin populations throughout lowland woodlands of California and human development in remote areas occupied by martins may lead to an increase in competition with these non-native birds. Other threats include collisions with vehicles and predation by feral cats.

DISTRIBUTION *of* PURPLE MARTIN (*Progne subis*)

Sources:
Airola, D.A. and B.D.C. Williams. 2008. Purple Martin (*Progne subis*). Pp. 293-299 in W.D. Shuford and T. Gardali (eds.), California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
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OAK TITMOUSE
Baeolophus inornatus


Oak Titmouse. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Sensitive Status

Federal: Partners in Flight WatchList; Migratory Bird Treaty Act.
State: G5/S3.
Other: American Bird Conservancy Rare Yellow List Species; Audubon WatchList Yellow; IUCN Least Concern.

Breeding Period: Mid-March to June.
Habitat: Occur throughout mixed oak woodlands, riparian woodlands, and residential plantings. Typically in warm, dry oak and oak-pine woodlands at low to mid-elevations.
Nesting: Female selects a natural cavity or an abandoned woodpecker cavity in a tree, stump, or fence post. Nest is built of vegetation and grass, and is lined with moss, hair, and feathers. *Clutch Size:* Usually 6 to 8 (3 to 9) white eggs that are unmarked or with minute reddish brown speckling.
Range: Occur throughout oak or oak-pine woodlands of interior northern California, west of the Cascade-Sierra, barely reaching into Oregon and Baja California at the opposite ends of its range.
Identification: A small, 10 to 21 g (0.4 to 0.7 oz), plainly colored gray bird with a modest pointed crest. Its head and bill are very short. Juveniles are similar to adults, but with softer feathers that are more loosely textured. A very distinct bird overall due to its small stature and habitat preference.
Life History: The Oak Titmouse hops about trees and shrubs or hangs upside down from foliage or bark while feeding on insects and seeds. They hammer seeds against a branch to open them, and also take berries, small fruits, and suet. Adults mate for life and pairs defend their year-round territories. Females incubate the eggs, and both parents feed young. Unlike other members of the family, the Oak Titmouse does not form flocks in winter.
Status in Morro Bay area: A somewhat common resident throughout the Morro Bay area (Beaulieu et al. 2006). The Oak Titmouse has been found at Black Hill of Morro Bay State Park, Elfin Forest Natural Preserve, Sweet Springs Nature Preserve, willows along the northern end of Pecho Road, and probably the town of Los Osos, along with eucalyptus and pine forest habitat throughout the area (T. Edell 2009, pers. comm., 22 Nov.).
Threats: The Oak Titmouse is primarily threatened from development of oak woodlands throughout California. Over 50% of its habitat has declined in the last century due to development and clearing for agriculture and rangeland. The Sudden Oak Death fungal disease has recently killed tens of thousands of oaks throughout California, which may cause loss of a lot of habitat for the Oak Titmouse.

DISTRIBUTION *of* OAK TITMOUSE (*Baeolophus inornatus*)

Sources:
American Bird Conservancy. 2007. The WatchList 2007. 25 March 2009 <http://www.abcbirds.org/abcprograms/science/watchlist/>.
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United States Fish and Wildlife Service. 2004. Code of Federal Regulations. Department of the Interior. Title 50, Part 10.13.

WRENTIT
Chamaea fasciata


Adult Wrentit. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Sensitive Status

Federal: Partners in Flight WatchList.
State: None.
Other: American Bird Conservancy Rare Yellow List Species; Audubon WatchList Yellow; IUCN Least Concern.

Breeding Period: March to mid-September.
Habitat: Common to chaparral, coastal sage scrub, and poison oak thickets. Also occur in streamside thickets and suburban gardens.
Nesting: Nest is well hidden in dense foliage of low shrubs, often only 30 to 122 cm (1 to 4 feet) above the ground. It is a neatly constructed, compact cup, usually made of bark strips and spider webs, and often lined with fine plant fibers and hair. The nest is built by both sexes and is either firmly lashed into place on small clusters of twigs, or built into a fork of a branch. The outside of the nest is often decorated with small bits of lichen. *Clutch Size:* Typically 4 (3 to 5) pale greenish blue eggs that are unmarked.
Range: A resident of chaparral and coniferous understory throughout southwestern Oregon to northwestern Baja California. They occur throughout cismontane California and are absent east of the Cascade-Sierra Nevada crest in the Great Basin and southeastern deserts.
Identification: A small, 14 to 15 cm (5.5 to 5.9 in), sparrow-sized bird with a uniformly streaked breast and conspicuous yellowish eyes. They have a small dark bill, buff throat, and a long rounded tail that is often cocked up. Its name is apt, for its head, beak, and eyes resemble those of a tit, whereas the long, cocked tail and secretive habits remind one of a wren. Due to their small size and often secretive nature, the call of the male, a "bouncing ping pong ball" song, is often heard much more than it is seen.
Life History: Wrentits actively forage in dense low growth, feeding heavily on insects mainly in spring and summer, and many berries especially in fall and winter. Adults may mate for life and spend their entire existence within the same nesting territory they originally chose. Incubation is by both parents, with the female mostly incubating at night and both taking turns throughout the day.
Status in Morro Bay area: A common year-round resident in chaparral and dense coastal scrub habitats throughout the area (Walgren et al. 2005).
Threats: Wrentits are still fairly widespread and common, but have declined in coastal areas mostly due to increasing development. Feral cats may be of growing concern to Wrentits near urban areas, especially since they nest very close to the ground. Other threats may include overgrazing, off-road vehicle use, and changes in the natural fire regime, however habitat destruction and urban development continue to be the most serious danger to this species.

DISTRIBUTION *of* WRENTIT (*Chamaea fasciata*)

Sources:
American Bird Conservancy. 2007. The WatchList 2007. 25 March 2009 <http://www.abcbirds.org/abcprograms/science/watchlist/>.
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CALIFORNIA THRASHER
Toxostoma redivivum

Sensitive Status

Federal: Partners in Flight WatchList; Migratory Bird Treaty Act.
State: None.
Audubon: American Bird Conservancy Rare Yellow List Species; Audubon WatchList Yellow; IUCN Least Concern.

California Thrasher adult. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

California Thrasher chick. Source: Tom Grey, www.geocities.com/tgrey41 (Used With Permission).

Breeding Period: February to June.
Habitat: Occur in lowland and coastal chaparral, riparian woodland, foothills, and valley thickets. Also in gardens and parks.
Nesting: Place nests in dense shrubs or extensive thickets usually only 61 to 122 cm (2 to 4 feet) above the ground. Nest is a bulky open cup of sticks and twigs that are lined with fine grass and other vegetation. *Clutch Size:* Usually 3 to 4 (2) pale blue eggs, evenly spotted with brown dots. Broods two times per year and sometimes even three.
Range: Coastal and inland California to northern Baja California.
Identification: The largest of the thrashers, 32 cm (12.6 in), with a long tail and long down-curved blackish bill. They are grayish brown overall, with a reddish brown underside and brown eyes. Males and females look alike and juveniles are similar in appearance to adults, but are generally duller and with less distinct features.
Life History: Although this bird is difficult to see in chaparral and other dense brush, it is often heard from its loud repetitious call. It feeds on the ground under the shelter of brush and uses its heavy, curved bill to hoe the soil and turn up leaf litter in search of insects, fruits, and nuts. Pairs may remain together on their territory all year, in which males sing and often mimic other birds to defend. Both parents feed nestlings initially, and the male takes over when the female begins laying her second clutch.
Status in Morro Bay area: An uncommon resident throughout preferred habitat in the Morro Bay area (CDPR staff).
Threats: The California Thrasher does not adapt well to habitat fragmentation and modification. Breeding populations no longer occur on the Monterey Peninsula likely due to the reduction of dense understory and development. Thrashers will leave disturbed areas even if remnant habitat patches remain. Other threats include pesticide use, particularly on citrus crops where the California Thrasher sometimes feeds.

DISTRIBUTION *of* CALIFORNIA THRASHER (*Toxostoma redivivum*)

Sources:
American Bird Conservancy. 2007. The WatchList 2007. 25 March 2009 <http://www.abcbirds.org/abcprograms/science/watchlist/>.
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United States Fish and Wildlife Service. 2004. Code of Federal Regulations. Department of the Interior. Title 50, Part 10.13.

YELLOW WARBLER
Dendroica petechia


Adult Yellow Warbler. Source: Gerald and Buff Corsi © California Academy of Sciences (Used With Permission).

Sensitive Status
Federal: Migratory Bird Treaty Act.
State: G5T3?/S2; Species of Special Concern.
Other: IUCN Least Concern.

Breeding Period: Mid-April to early August.
Habitat: Common to bushes, streams, and gardens. Their breeding habitat includes low land riparian woodlands, dry montane chaparral with scattered trees, and montane coniferous forests with bushy understories. In the west they are typically restricted to streamside thickets. Occur in a wide variety of habitat during migration, but are partial to shady areas.
Nesting: Nests are placed in an upright fork of branches in shrubs and small trees, from 0.6 to 18 meters (2-60 feet) above the ground. Females build a compact open cup nest out of weed stalks, bark, and grass, lined with plant down and fur. *Clutch Size:* Usually 4 to 5 (3 to 6) greenish white eggs that have a variety of specks or spots of brown, olive, and gray.
Range: Breeds throughout much of Canada and the United States with the exception of some southern states. In California, Yellow Warblers breed throughout much of their historic range with the exception of the Central Valley and Owens Valley. They winter throughout Central America south to northern South America.
Identification: A typically active and inquisitive warbler with a yellowish body, dark yellow-olive tail, and black eyes and bill. They have bright yellow highlights in their wings that are very distinctive. Breeding males have defined red streaks on their breast, while breeding females have only faint red streaks. Juveniles lack obvious breast streaks entirely and are quite drab overall.
Life History: Yellow Warblers feed mostly on insects, with up to two-thirds of their diet consisting entirely of caterpillars of various kinds. They forage from low levels as well as treetops, taking insects from vegetation and catching flying insects in midair. Males tend to forage in more open and higher foliage than females, and will court females by actively pursuing them for 1 to 4 days. Females incubate eggs and do most of the feeding of young, which leave the nest around 9 to 12 days after hatching.
Status in Morro Bay area: Seasonally uncommon from April to September in low trees and woodland edges throughout the area, especially in willow habitats (Beaulieu et al. 2006, Heath 2008). Some pairs may nest in the area, but specific locations and accounts have not been reported.
Threats: Loss and degradation of breeding habitat is the main threat to Yellow Warblers. They are highly sensitive to decreases in deciduous habitat, riparian habitat heterogeneity, and riparian corridor width changes. In California they are also threatened by Brown-headed Cowbird parasitism. Some pairs may defend against cowbird parasitism by rebuilding a new nest on top of cowbird eggs or by deserting the nest entirely. Predation by Douglas Squirrels (*Tamiasciurus douglasii*) and Steller's Jays (*Cyanocitta stelleri*) also threaten this species, with higher predation likely occurring to nests in close proximity with trees and forest edges.

DISTRIBUTION *of* YELLOW WARBLER (*Dendroica petechia*)

Sources:
Beaulieu, J., L. Andreano, and M. Walgren. 2006. Common Birds of the Estero Bay Area. Morro Bay National Estuary Program, Morro Bay, California, and California Department of Parks and Recreation, San Luis Obispo Coast District, San Simeon. 53 pp.
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Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White (eds.). 1990. California's Wildlife. Vol. II. California Department of Fish and Game, Sacramento. 732 pp.

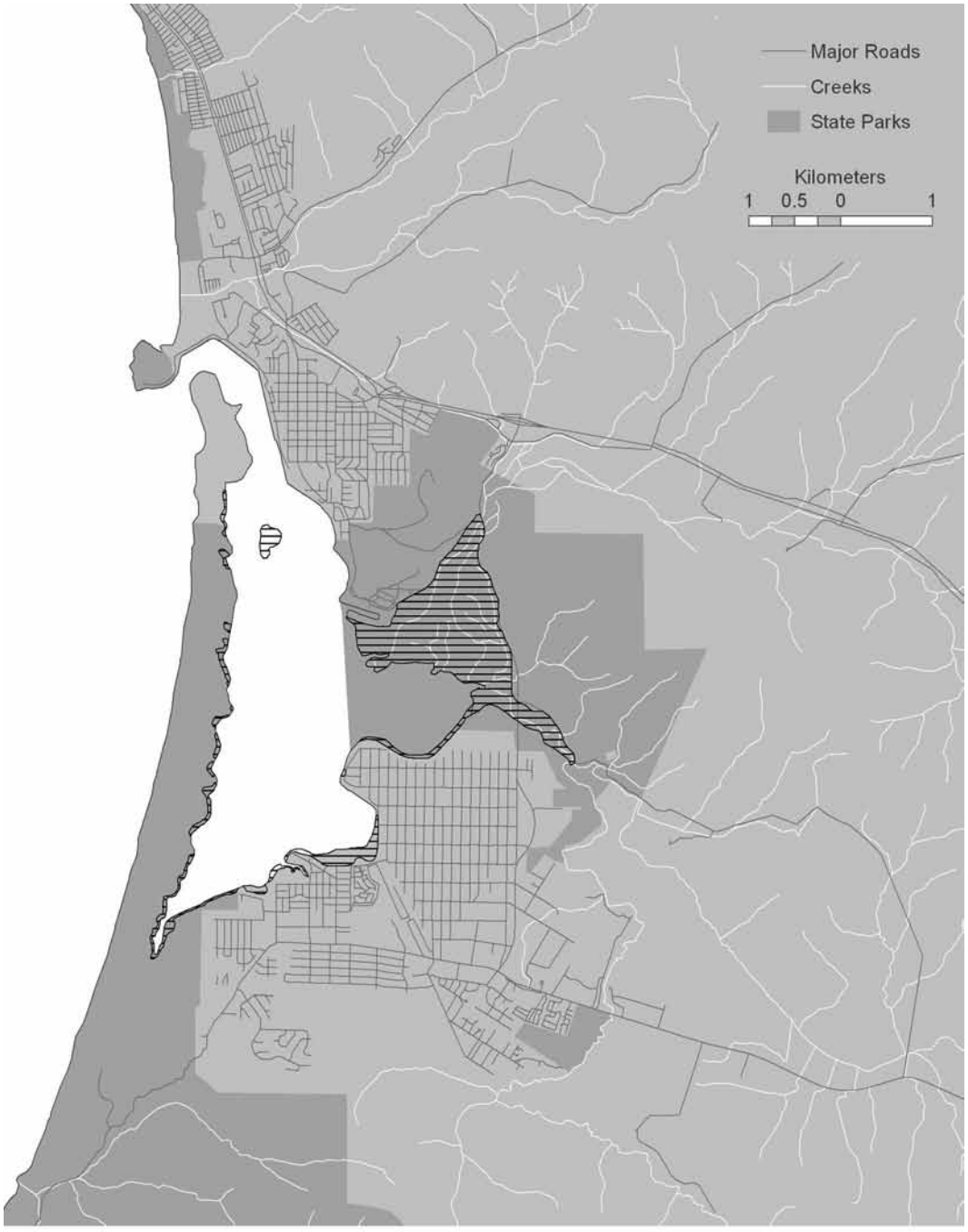
LARGE-BILLED SAVANNAH SPARROW
Passerculus sandwichensis rostratus


Adult Savannah Sparrow. Source: U.S. Fish and Wildlife Service.

Sensitive Status
Federal: Migratory Bird Treaty Act.
State: G5T2T3/S2?; Species of Special Concern.
Other: IUCN Least Concern.

Breeding Period: May to September.
Habitat: This subspecies of the Savannah sparrow only inhabits salt marshes.
Nesting: Nest site is usually on ground and well hidden among grass or weeds. Build a cup nest of grass that can only be entered by a "tunnel" of organic material. *Clutch Size:* Usually 2 to 6 (4) whitish to pale tan or greenish eggs, with brown markings that are usually concentrated at the larger end.
Range: Breeds mainly in the delta of the Colorado River and adjacent coasts of the Gulf of California in northeastern Baja California, and south to northwestern Sonora, Mexico. In fall and winter it travels southward, westward, and northward to occupy a range form coastal southern California and the Salton Sea, south to northern Sinaloa and the Cape District of Baja California.
Identification: A small, 11 to 15 cm (4.3 to 5.9 in), songbird with a finely streaked breast, pale streaked underparts, and mottled brown upperparts. They have a yellow lore, light jaw line, and pale legs and bill. They are similar to typical savannah sparrows in size, but stockier and with a bill that is 30% larger. Other differences in appearance that set it apart from typical savannah sparrows is a curved culmen and faintly streaked crown and back, as well as a different voice.
Life History: Savannah sparrows, especially in coastal areas and islands, tend to return each year to the area where they hatched, which is the driving force for the differentiation of numerous savannah sparrow subspecies. Of the 17 recognized subspecies, nearly one third are resident or partially migratory in salt marshes of California and Mexico. Savannah sparrows mostly forage by running and walking on the ground, typically feeding on insects and seeds, but also on tiny crustaceans and mollusks. Often forage in small loose flocks, but are generally alone during the breeding season. Males sing to attract mates and defend nesting territory. Females incubate eggs and both parents bring food to their young.
Status in Morro Bay area: An uncommon non-breeding visitor occurring primarily from late August to early March (CDPR staff).
Threats: Large-billed Savannah Sparrows are likely threatened because of massive habitat changes in the delta of the Colorado River after construction of upstream damns. Potential wintering habitat of this species has also been limited due to the cumulative loss of about 75% of southern California's coastal salt marsh habitat caused by extensive disturbance and development.

DIST. *of* LARGE-BILLED SAVANNAH SPARROW (*Passerculus sandwichensis rostratus*)



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TRICOLORED BLACKBIRD
Agelaius tricolor


Adult male Tricolored Blackbird. Source: Rob Schell 2008 (Used With Permission).

Sensitive Status

Federal: Bird of Conservation Concern; Species of Concern; Partners in Flight WatchList; Migratory Bird Treaty Act.
State: G2G3/S2; Species of Special Concern.
Other: American Bird Conservancy Red List Species; Audubon WatchList Red; Bureau of Land Management Sensitive Species; IUCN Endangered.

Breeding Period: Mid-March to early August.
Habitat: Typically occur in cattail (*Typha* spp.) or tule (*Schoenoplectus* spp.) marshes, forage in fields and pastures. Breed in large freshwater marshes.
Nesting: Nest in colonies more dense than Red-winged Blackbirds, with nests often less than one meter apart. Nests are built in cattails or bulrushes in freshwater marsh, or in willows at the waters edge. Females construct an open cup nest built of reeds, leaves, grass, and rootlets that are lined with finer materials. *Clutch Size:* Usually 4 (2 to 6) pale blue-green eggs that are marked with black, brown, and purple concentrating at the larger end.
Range: Native to California with the exception of a few small nesting colonies in Oregon, Washington, Nevada, and coastal Baja California. Over 90% of the Tricolored Blackbird populations reside in the Central Valley of California. The rest occupy other lowland areas of California, west of the Cascade-Sierra axis and in valleys at higher elevation in the north.
Identification: Tricolored Blackbirds are stocky, 17 to 23 cm (6.7 to 9.1 in), and very similar in appearance to Red-winged Blackbirds, but their wingtips are distinctively more pointed and they have a much thinner bill. Males have a glossy black body with dark red lesser coverts and white median coverts. Females have cold gray tones with a whitish-gray throat.
Life History: Tricolored Blackbirds often forage in large flocks for seeds and invertebrates in open fields. Much of their foraging is done while walking on the ground, but will sometimes forage up in shrubs and trees. To attract females, males will perch on high stalks of vegetation, fluff out their feathers, partly spread their tails, then lower their head and sing. Incubation is by female for about 11 days, and then both parents feed young.
Status in Morro Bay area: An uncommon resident in preferred habitat throughout the Morro Bay area. They may nest in mixed colonies with Red-winged Blackbirds in reedy marshes and farmlands.
Threats: Tricolored Blackbirds are threatened mostly by direct loss and degradation of their habitat. Most of their native habitats in the Central Valley have been replaced by urbanization and agricultural croplands that do not suit their needs. Increased predator access caused by humans is also a great threat to this species. Predations by Black-crowned Night-Herons (*Nycticorax nycticorax*), Common Ravens (*Corvus corax*), and Coyotes (*Canis latrans*) have led to the loss of entire colonies in the past and present. In addition, the Tricolored Blackbird is threatened from various poisons and contaminates including: deliberate poison exterminations in an attempt to control damage to rice crops in the Central Valley, aerial herbicide applications, and hatch failures from contamination with mosquito abatement oils.

DISTRIBUTION *of* TRICOLORED BLACKBIRD (*Agelaius tricolor*)

Sources:
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MORRO BAY KANGAROO RAT
Dipodomys heermanni morroensis

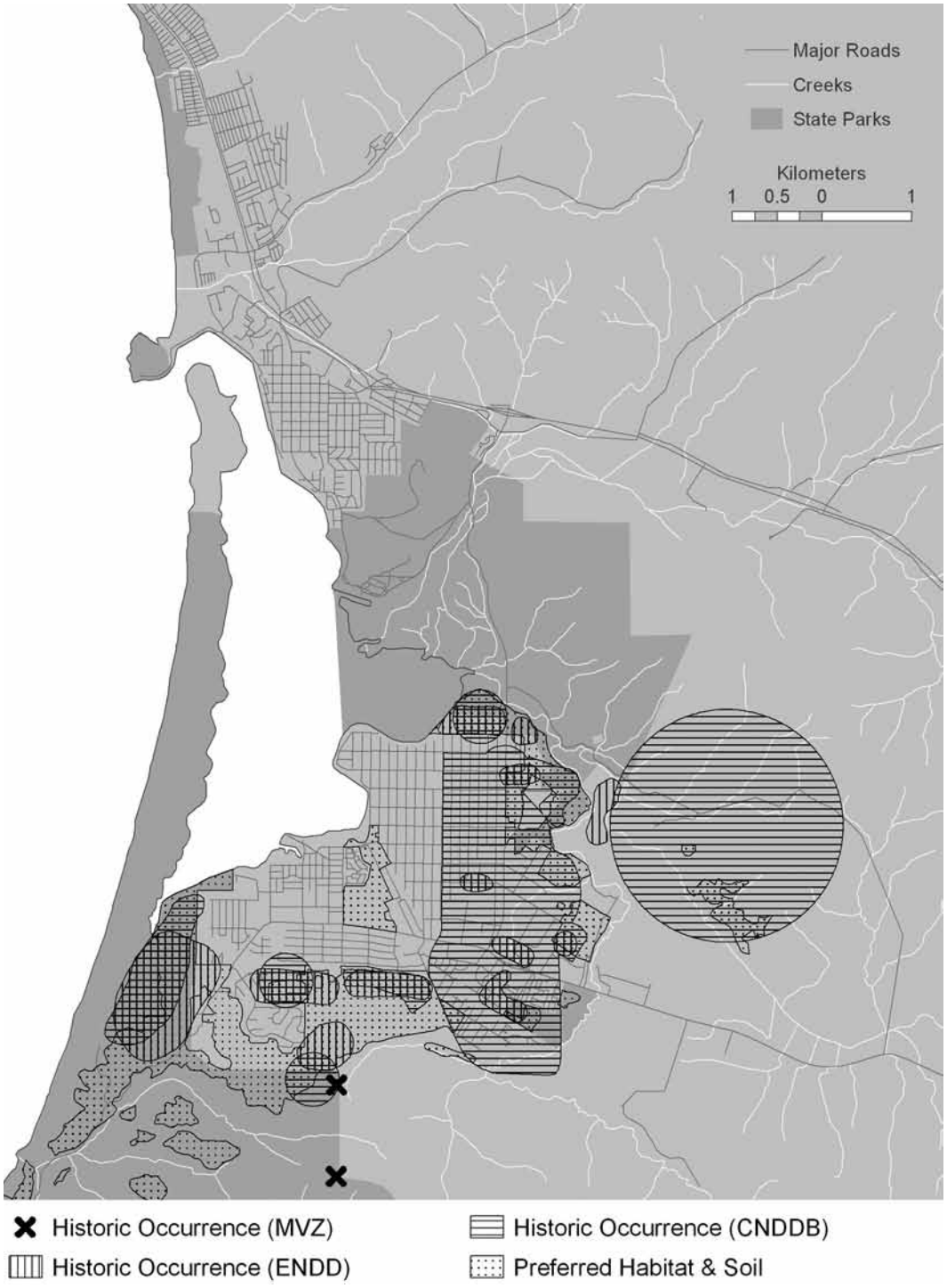

Heermann's Kangaroo Rat. Source: U.S. Fish and Wildlife Service.

Sensitive Status

Federal: Endangered, October 13, 1970.
State: G3G4T1/S1; Endangered, June 27,1971; Fully Protected Species; Endemic Special Status Vertebrate.
Other: IUCN Least Concern (subspecies not noted).

Breeding Period: February to October.
Habitat: Most often occur in association with sandy soils, typically in semi-open areas within coastal scrub and chaparral.
Nesting: Young are born in a burrow chamber about 30 to 75 cm (12 to 30 in) below the surface, in a nest of dried grass, roots of grass, and seed husks. *Litter Size:* Typically 2 to 3 pups, with up to 3 litters per year.
Range: The species occurs in the San Joaquin Valley across Kern County and into interior and coastal Santa Barbara, Monterey, and San Luis Obispo Counties and from Lower Sonoran to Transition zone. The Morro Bay subspecies occurs only within the Morro Bay area.
Identification: A medium kangaroo rat, 250 to 313 mm total length (10 to 12.3 in), with a moderately broad face and five toes on the hind feet. They have a false eye spot behind the ears and a very long tail (two times longer than body) that aid in escape from predators. Their dorsal hair varies in color from tawny-olive strongly overwashed with black to orange-yellow. Have a tail crest that may be dark blackish, and the Morro Bay subspecies typically lacks a hip stripe.
Life History: Kangaroo rats are mostly granivorous, but are known to eat some forbs and green grasses seasonally. They can apparently survive without drinking water, receiving water only from food and dew. Nocturnal and active year round, but may only come out of burrows for an hour per day. Young begin to grow fine hairs within three days and open their eyes in about two weeks after birth. They are weaned at 17 to 25 days and can breed at less than 2 months of age. Principle predators may be rattlesnakes, gopher snakes, owls, badgers, foxes, coyotes, and other predatory mammals.
Status in Morro Bay area: Restricted to less than 5 km squared (1,235 U.S. acres) in the Morro Bay area in the past, this animal is now potentially extinct. The last recorded sighting was in 1987 in "Bayview site" of Los Osos (Aryan Roest Mammal Collection 2010). Most specimens from Cal Poly's Aryan Roest Mammal Collection were from 0.8 to 4 km (0.5 to 2.5 miles) southwest of Baywood Park, and from 1.6 to 2.4 km (1 to 1.5 miles) east to northeast of Baywood Park.
Threats: This subspecies was once common to the Morro Bay area. By 1988 its population was projected to have declined by more than 80%, and today it is considered potentially extinct. Major declines of this species have been linked to degradation, loss, and fragmentation of habitat. It is additionally on the brink of extinction (if not already extirpated) by random naturally occurring events due to its very low number of individuals and populations.

DISTRIBUTION *of* MORRO BAY KANGAROO RAT (*Dipodomys heermanni morroensis*)



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BIG FREE-TAILED BAT
Nyctinomops macrotis

Adult Big Free-tailed Bat. Source: ©Merlin D. Tuttle, Bat Conservation International, www.batcon.org (Used With Permission).

Adult Big Free-tailed Bat. Source: M. Siders, Bureau of Land Management.

Sensitive Status
Federal: None.
State: G5/S2; Species of Special Concern.
Other: Western Bat Working Group Medium Priority; IUCN Least Concern.

Breeding Period: Fall to winter, followed by delayed fertilization (ovulation and fertilization occur in spring).
Habitat: Typically in desert and arid grassland areas with rocky outcrops, cliffs, or canyons present to roost. Occasionally roost in buildings, caves, or tree cavities.
Maternal Roosting: Adult females form nursing colonies mostly in rock crevices, with evidence of long term use. *Litter Size:* A single young is born in June or July.
Range: From southwestern North America to northern and central Mexico, and throughout South America. Occurs in southwestern British Columbia, Canada, and as far east as South Carolina in North America. Have also been documented in Cuba, Jamaica, and Hispaniola.
Identification: Like all bats in this family, the Big Free-tailed Bat has a free tail tip that extends beyond the edge of the interfemoral membrane. This species is the largest member of the genus, with a forearm length of 58 to 64 mm (2.3 to 2.5 in). It is pale reddish brown to almost black, but hairs are white at the base. Their large broad ears are joined at the center of the forehead, and they have wrinkled upper lips.
Life History: Feed almost entirely on large moths, but will occasionally forage on crickets, grasshoppers, flying ants, and other insects. This species is a powerful flyer and migrates seasonally. Appear to return to roost sites in a ritualized fashion, which involves a general reconnaissance of the site followed by several landing trials before entry. Produce an audible echolocation call, which is thought to be loud, with a frequency range of 17 to 30 kHz. Owls appear to be the only documented predators of this species.
Status in Morro Bay area: Although very uncommon, it has a scattered distribution throughout much of the state, and could be expected almost anywhere. There is a single record of this bat in the area, noted in Morro Bay from 1981 (CNDDB 2009).
Threats: Possibly threatened by impacts to foraging areas from poor riparian management, agricultural grazing, pesticide use, and disturbance to roost sites. There is not enough knowledge regarding the habitat requirements of this species to identify other potential threats.

DISTRIBUTION *of* BIG FREE-TAILED BAT (*Nyctinomops macrotis*)

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WESTERN RED BAT
Lasiurus blossevillii

Sensitive Status

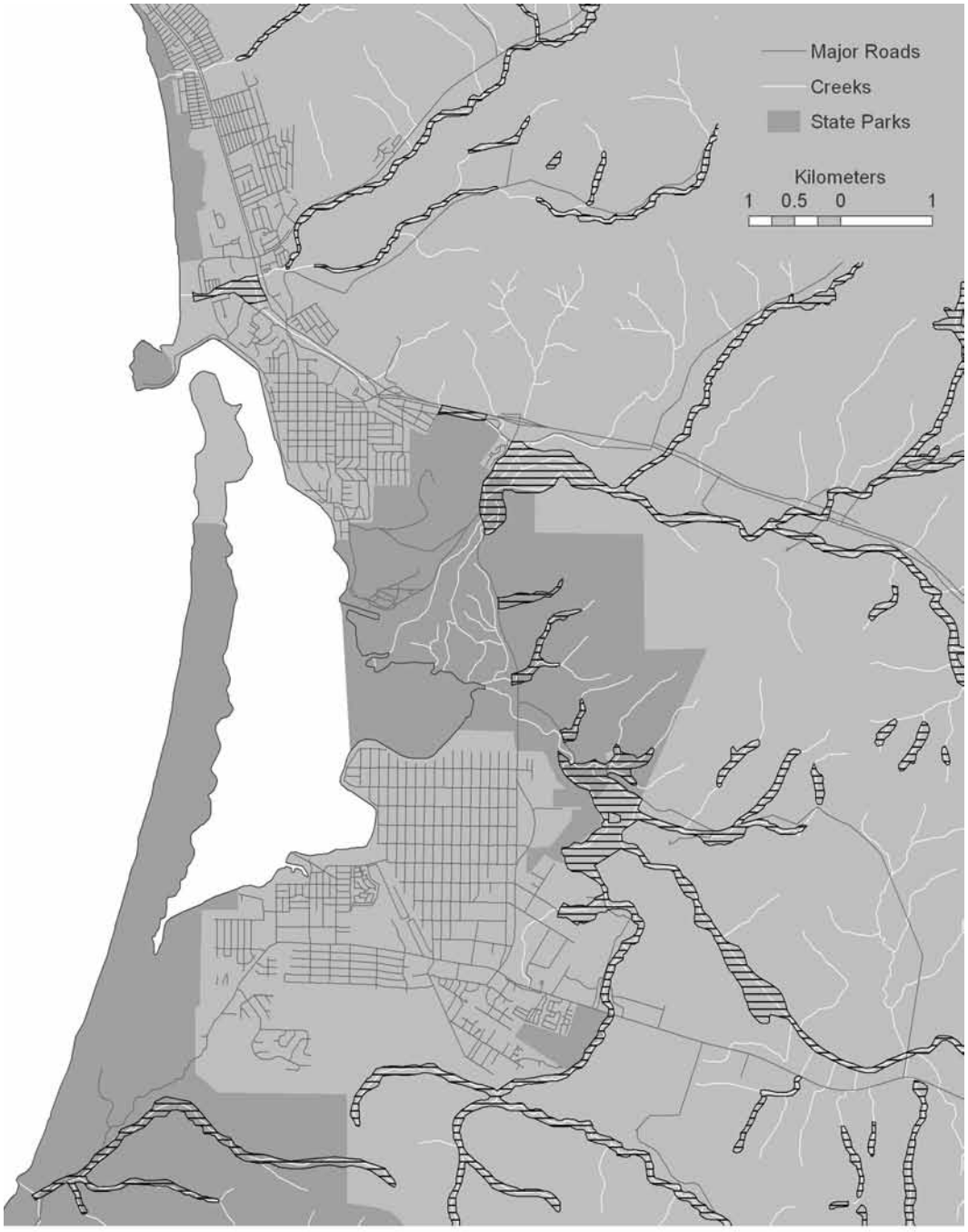
Federal: USDA Forest Service Sensitive Species.
State: G5/S3?; Species of Special Concern.
Other: Western Bat Working Group High Priority; IUCN Least Concern.


Adult Western Red Bat. Source: ©Merlin D. Tuttle, Bat Conservation International, www.batcon.org (Used With Permission).


Adult Western Red Bat. Source: U.S. National Park Service.

Breeding Period: Mate in late summer or early fall, followed by delayed fertilization (ovulation and fertilization occur in spring).
Habitat: Mostly in riparian areas associated with cottonwoods (*Populus* spp.), and other wooded habitats. Roost in foliage of trees or shrubs, and occasionally caves. Day roosts are commonly in habitats adjacent to streams or open fields, orchards, and sometimes urban areas. Rarely enters buildings.
Maternal Roosting: Females and males roost solitary in foliage of trees or shrubs. *Litter Size:* Usually give birth to twins, with an average litter size of 3, but may have litters of up to 5 pups a year.
Range: A broadly distributed bat, from southern British Columbia in Canada, through much of western United States, Mexico, and Central America, reaching as far south in South America as Argentina and Chile.
Identification: A large, forearm length 37 to 42 mm (1.5 to 1.7 in), distinctive red bat with mottled red and grayish fur, and white patches on the shoulders. Their color can vary from intense red to yellow-brown and they are actually rather cryptic, resembling dead leaves when they curl up to sleep. They have low rounded ears, with a short blunt tragus. Males are much brighter in color than females.
Life History: Red bats are commonly referred to as "tree bats" because they roost only in tree foliage. They are closely associated with cottonwoods in riparian areas, favoring localities where leaves form a dense canopy above with branches that do not obstruct flyway below. Like all bats, Western Red Bats are nocturnal and generally begin to forage one to two hours after sunset. They typically feed on flying insects along forest edges or small clearings, but have also been observed foraging around streetlights and floodlights. This species is considered to be highly migratory, and the timing of migration and summer ranges of males and females appear to be different. Winter behavior of this species is not known, but they may hibernate in leaf litter akin to the Eastern Red Bat.
Status in Morro Bay area: Migrate throughout area mostly in fall and spring. Although reproductive females and young occur on the Central Coast in the summer, they are more common inland, particularly the Central Valley where they find desired summer temperatures of 27 to 35°C (80 to 95°F).
Threats: Loss of riparian areas, primarily due to agricultural conversion and creation of reservoirs has reduced both roosting and foraging habitat of red bats. Use of pesticides in fruit orchards may pose a threat to roosting bats, and may also significantly reduce amount of prey insects available. Due to their foliage dwelling nature, red bats may be threatened by predation, with records of red bats being eaten by jays, opossums, and domestic cats. Controlled burns also pose a threat as red bats may roost in leaf litter from late fall to early spring, a time in which controlled burns are usually conducted.

DISTRIBUTION *of* WESTERN RED BAT (*Lasiurus blossevillii*)



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PALLID BAT
Antrozous pallidus


Adult Pallid Bat. Source: ©Merlin D. Tuttle, Bat Conservation International, www.batcon.org (Used With Permission).


Adult Pallid Bat. Source: U.S. Geological Survey.

Sensitive Status

Federal: USDA Forest Service Sensitive Species.
State: G5/S3; Species of Special Concern.
Other: Western Bat Working Group High Priority; Bureau of Land Management Sensitive Species; IUCN Least Concern.

Breeding Period: October to February, followed by delayed fertilization (ovulation and fertilization occur in spring).
Habitat: Most abundant in desert habitats, but also occur in oak woodlands, coniferous forest, and open farmland. Roost mostly in rocky outcrops, but also in caves, mines, buildings, and hollow trees.
Maternal Roosting: Form colonies of 30 to 70 (12 to 125) animals in March to May, and stay together until October. Males may roost in maternity colonies, but are usually separate from females and young. *Litter Size:* Usually 2 (1 to 3), with about 20 percent being single births.
Range: Occur throughout western North America from southern British Columbia, south to central Mexico, and east to Texas. Most abundant in Great Basin, Mojave, and Sonoran Deserts of North America. There is an isolated subspecies, *A. pallidus koopmani*, which is endemic to Cuba.
Identification: A large bat, forearm length 45 to 60 mm (1.8 to 2.4 in), with cream-yellow to light brown wooly fur, and large well-separated pinkish ears. They have relatively large eyes and a U-shaped ridge on the top of their large, bare muzzle. This bat produces a distinctive skunk-like odor from small wart-like pararhinal glands on the face, which is thought to be a defense mechanism.
Life History: Pallid Bats are very good at climbing and crawling, but are less agile and slower flyers compared to smaller bats. Forage by crawling on the ground and tree trunks to capture scorpions and other large invertebrates. Often detects prey by passive listening and vision rather than echolocation. When returning to day roosts after foraging, pallid bats swarm and vocalize around the entrance for 15 to 45 minutes while calling individuals back to the roost. The swarm evaluates the roost entrance until one bat enters and calls the rest of the colony in.
Status in Morro Bay area: Current roosting sites within the area are unknown. Three female specimens were collected in the City of Morro Bay on November of 1956; one male was collected in January of 1993, and another male in May of 2000 (CNDDB 2009). A 1966 specimen from Cal Poly's Aryan Roest Mammal Collection exists from Toro Creek Road, just north of the City of Morro Bay. Could night roost in rock outcrops, buildings, hollow trees, and other dark crevices, and day roost under bridges and other semi-dark areas throughout. On the Central Coast of California, pallid bats are most frequently found foraging in open oak woodlands, but also feed in wooded canyons.
Threats: Appears to be intolerant of suburban and urban development. Threatened throughout California from habitat conversion (i.e. oak woodland to agriculture). Current timber harvest practice, especially removal of hardwoods such as ponderosa pine snags likely pose serious threat to populations in forested areas. Often targeted by pest control operators and vandals due to their often highly visible roosting sites. Threatened in coastal California mostly by loss or modification of roosting and foraging habitat due to urban development and agriculture expansion.

DISTRIBUTION *of* PALLID BAT (*Antrozous pallidus*)

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FRINGED MYOTIS
Myotis thysanodes

Sensitive Status
Federal: None.
State: G4G5/S4; Species of Special Concern.
Other: Western Bat Working Group High Priority; Bureau of Land Management Sensitive Species; IUCN Least Concern.


Profile of adult Fringed Myotis. Source: ©Merlin D. Tuttle, Bat Conservation International, www.batcon.org (Used With Permission).


Adult Fringed Myotis. Source: U.S. Geological Survey.

Breeding Period: Mating occurs in fall, followed by delayed fertilization (ovulation and fertilization occur from late April to early May).
Habitat: Most common in dry woodlands (pinyon-juniper, ponderosa pine, and oak), but also found in a variety of habitats including grassland, desert scrub, mesic coniferous forest, and sage-grass steppe.
Maternal Roosting: Colonial roosters from April to September, with 10 to 2,000 individuals per roost site (though large colonies are exceedingly rare, typically containing only 10 to 20 adults in California). Roost in caves, buildings, bridges, mines, rocks, and cliff faces, from dry and moderately warm to damp and cool in temperature. Also roost in decaying trees and snags throughout its range in western United States and Canada. *Litter Size:* One young per female, born unfurred and with eyes open, typically in late June to early July.
Range: Most common at mid-elevations throughout much of western North America from southern British Columbia, Canada, south to Chiapas, Mexico and from Santa Cruz Island, California, east to Black Hills of South Dakota.
Identification: A small-bodied, forearm measures 40 to 46 mm (1.6 to 1.8 in), bat with drab brown to reddish-brown upperparts and often paler underparts. Easily distinguished from other Myotis bats by having long ears and a distinct fringe of hairs along the posterior edge of tail membrane. It has the shortest ears among the group of long-eared Myotis.
Life History: The Fringed Myotis makes slow and maneuverable flights. It feeds mostly on beetles and moths, but also on a variety of invertebrates depending on prey availability, geography, and time period. Forage over open water and other open habitats, but also adapted for foraging within forest interior and along forest edges by gleaning flightless invertebrates off foliage. After copulation in fall, females break up to roost in maternity colonies, while males roost singly or in small groups. Females store sperm over winter, with ovulation and fertilization occurring in spring followed by a 50 to 60 day gestation period. Young are capable of flight at 16 to 20 days.
Status in Morro Bay area: Very uncommon to the area. Although specific roosting sites are unknown, they have the potential to roost within preferred habitat throughout the Morro Bay area.
Threats: Appears to be extremely sensitive to disturbance at roost sites and to human handling. The loss or modification of roosting habitat is perhaps the largest threat to this species, with specific threats being loss of current and future large decadent trees, and replacement of buildings and bridges with non bat friendly structures. In general, the long-term persistence of North American bat species is threatened by loss of clean open water, modification or destruction of roosting and foresting habitat, and disturbance or destruction of hibernacula. Chemicals in the environment that affect bats or their prey also pose major threats.

DISTRIBUTION *of* FRINGED MYOTIS (*Myotis thysanodes*)

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YUMA MYOTIS
Myotis yumanensis

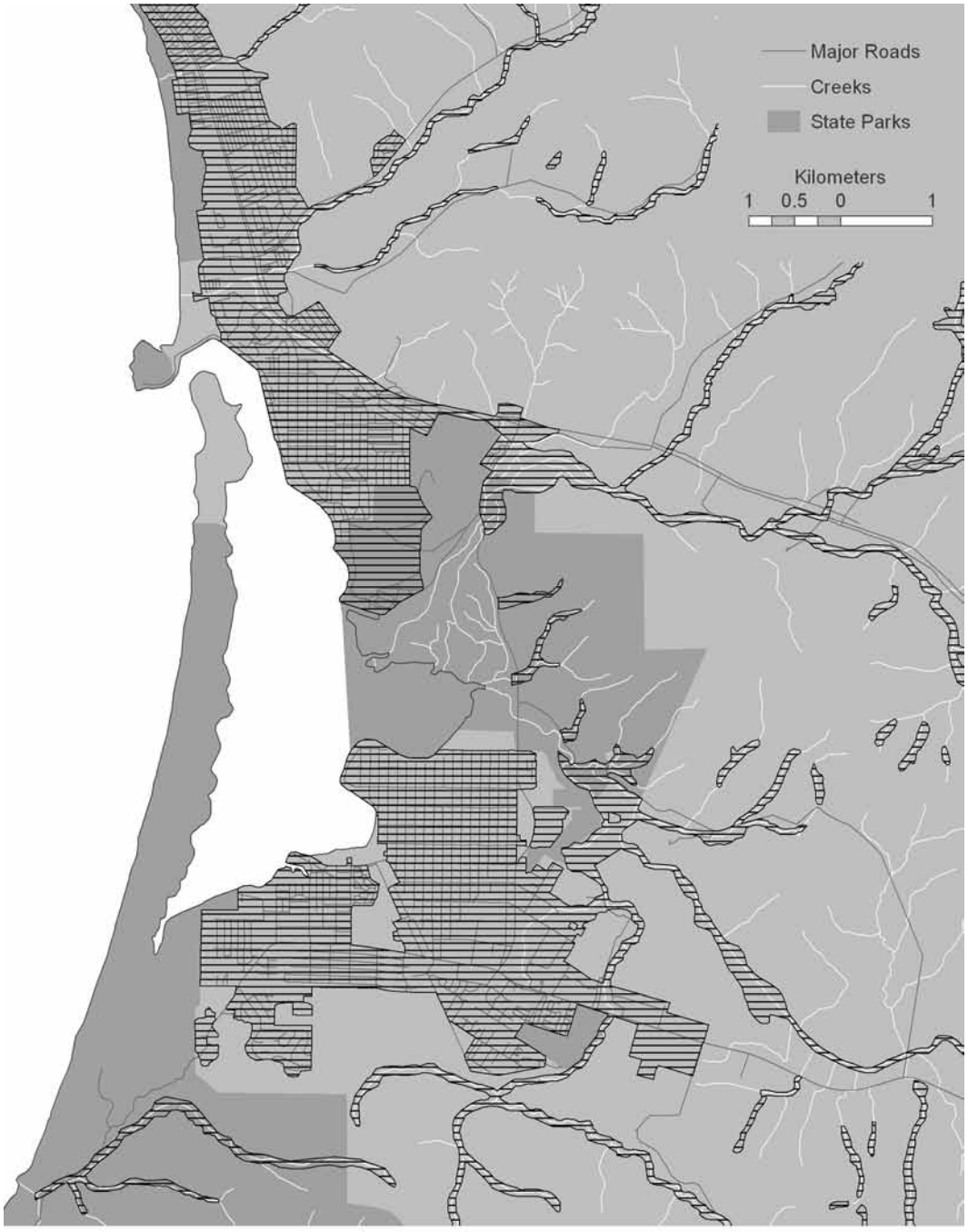
Sensitive Status
Federal: None.
State: G5/S4?.
Other: Western Bat Working Group Low to Medium Priority; Bureau of Land Management Sensitive Species; IUCN Least Concern.


Adult Yuma Myotis. Source: ©Merlin D. Tuttle, Bat Conservation International, www.batcon.org (Used With Permission).


Adult roosting Yuma Myotis. Source: Kristi Dubois, Montana Fish, Wildlife & Parks.

Breeding Period: Mating occurs in fall to early winter, followed by delayed fertilization (ovulation and fertilization occur in spring).
Habitat: Found in a variety of habitats from juniper and riparian woodlands to desert regions, always close to open water; preferring streams, rivers, ponds, lakes, and other areas close to open water. Most often roost in buildings or bridges, but also in mines, caves, tree crevices, and sometimes even in abandoned cliff swallow nests.
Maternal Roosting: Females segregate into nursing colonies of up to 2,000 individuals in caves, abandoned buildings, or anywhere else that has a high and stable temperature of 30 to 55°C (86 to 131°F). *Litter Size:* A single young is born from late May to early June.
Range: Western third of North America from British Columbia, Canada, to Baja California and southern Mexico. In the United States it occurs in all Pacific Coast states, as far east as western Montana in the north, and east to western Oklahoma in the south.
Identification: A medium sized Myotis, forearm length 30 to 38 mm (1.2 to 1.5 in), with unkeeled calcar and short ears. Usually gray or brown to pale tan in color dorsally, with a whitish belly. Ears and membranes are most often pale brown to gray. Very similar to Little Brown Myotis, but Yuma Myotis is slightly smaller, with paler ears and less glossy fur.
Life History: Like most bats, the Yuma Myotis is nocturnal. They emerge at dusk and fly very low over water to feed on a wide variety of small flying insects. These bats are very efficient foragers, usually done feeding in only two hours after sunset. They locate insects in flight by emitting ultrasonic sounds, then either catch the insects in their mouths or use their tail membranes as a pouch to snare larger prey. Although efficient hunters, they are surprisingly inconsistent and fluttering in flight. While roosting they hang on a vertical surface by their thumbs and toes with their wings tucked alongside their bodies, as seen in the above photo.
Status in Morro Bay area: Specific roosting sites within the area are unknown. Due to their secluded nocturnal nature, lack of adequate sightings is not necessarily a sign of absence. They occupy a wide range in California, and possibly dwell in preferred habitat throughout the Morro Bay area.
Threats: This species frequently occurs in anthropogenic structures and is thus vulnerable to destructive pest control activities throughout Morro Bay. May be susceptible to certain riparian management practices due to its need for open water to forage, and in the southwest this species is threatened by loss of riparian habitat and decline of permanent water sources. In other areas the Yuma Myotis is also threatened by logging, and a study in western Oregon showed that feeding activity was up to eight times higher along forested edges of streams compared to those in logged areas.

DISTRIBUTION *of* YUMA MYOTIS (*Myotis yumanensis*)



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LONG-LEGGED MYOTIS
Myotis volans


Adult Long-legged Myotis. Source: ©Merlin D. Tuttle, Bat Conservation International, www.batcon.org (Used With Permission).


Adult Long-tailed Myotis. Source: Kristi Dubois, Montana Fish, Wildlife & Parks.

Sensitive Status

Federal: None (previously listed as Species of Concern).
State: G5/S4?; Species of Special Concern.
Other: Western Bat Working Group High Priority; IUCN Least Concern.

Breeding Period: Mating occurs in fall, followed by delayed fertilization (ovulation and fertilization occur from late April to early May).
Habitat: Primarily found in coniferous forests, but also found in oak and riparian woodlands and bushy areas extending to deserts.
Maternal Roosting: Colonies of 200 to 500 individuals roost in hollow trees, rock crevices, mines, caves, and buildings. *Litter Size:* A single young is born in late May to August.
Range: Occurs across western North America from southeastern Alaska, British Columbia and Alberta, Canada, to Baja California and central Mexico. Throughout California and western United States from the Pacific Coast to the Great Plains and central Texas.
Identification: A large Myotis, forearm length 35 to 42 mm (1.4 to 1.7 in), with longer, denser fur on the underside of the wing between the knee and elbow compared to other species. It has short, keeled calcar, and short rounded ears. The color of its fur varies from dark brown to reddish buff, with darker ears and membranes.
Life History: The Long-legged Myotis is nocturnal, but emerges early, long before the sky is dark. They forage in open areas and over ocean, feeding primarily on moths and other soft-bodied insects. Individuals copulate in autumn and females store the sperm overwinter, ovulating in the spring and giving birth from May through August. Adults have been documented to live a minimum of 21 years.
Status in Morro Bay area: Specific roosting sites within the area are unknown. This species occupies a wide range throughout California, and are expected to occur in oak and riparian woodlands of Montaña de Oro State Park and Irish Hills. They also may occur in various other locations within preferred habitat throughout the area.
Threats: May be affected by the closure of abandoned mines without prior adequate surveys and by some forest-management practices. Past declines were likely due to DDT pesticide use in the 1970's, as residues of DDT and its metabolites have been found in this species in Oregon. Potential threats to this species in the Morro Bay area include agricultural pesticides that may affect bats and their prey, habitat loss or alteration due to construction and development, and other human induced factors.

DISTRIBUTION *of* LONG-LEGGED MYOTIS (*Myotis volans*)

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Andreano, L., J. Beaulieu, and M. Walgren. 2006. Terrestrial Mammals of the Estero Bay Area. Morro Bay National Estuary Program, Morro Bay, California, and California Department of Parks and Recreation, San Luis Obispo Coast District, San Simeon. 14 pp.

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LONG-EARED MYOTIS
Myotis evotis


Adult Long-eared Myotis. Source: ©Merlin D. Tuttle, Bat Conservation International, www.batcon.org (Used With Permission).


Adult Long-eared Myotis. Source: Kristi Dubois, Montana Fish, Wildlife & Parks.

Sensitive Status
Federal: None.
State: G5/S4?; Watch List Species.
Other: Western Bat Working Group Medium Priority; Bureau of Land Management Sensitive Species; IUCN Least Concern.

Breeding Period: Mating occurs in fall to early winter, followed by delayed fertilization (ovulation and fertilization occur from late April to early May).
Habitat: In California they are found in a variety of habitats including riparian desert scrub, chaparral, agricultural areas, and low elevation oak woodlands, but tend to favor giant sequoia (*Sequoiadendron giganteum*) and other coniferous forest habitats.
Maternal Roosting: During summer, up to 30 reproductive females form maternity colonies under loose bark, hollow trees, rock crevices, fissures in clay banks, and sometimes in caves, mines, and buildings. *Litter Size:* One young per female is born in late spring to early summer.
Range: Across western North America from southwest Canada to Baja California, and eastward in the United States through northern Arizona, New Mexico, and north into the Dakotas. Generally absent in Central Valley and deserts of California.
Identification: A pale brownish to pale-gold colored bat with forearms measuring from 36 to 41 mm (1.4 to 1.6 in). Differs from other species by having longer ears, reaching more than 21 mm (0.8 in), which are glossy dark brown to black. They also have a slightly larger body size and lack a fringe on the tail membrane.
Life History: Feed primarily on beetles and moths in most settings, and feed on a variety of insects in others. Forage over open meadows near tall trees, along forest edges, and along riparian corridors by flying low (1 to 2 meters above ground) and gleaning insects off the surface of vegetation. Also catch insects by aerial pursuit. In California, roost sites have been documented under loose bark of black oaks (*Quercus kelloggii*), rock crevices of highway riprap, and a number of buildings. In addition, caves, mines, and bridges are frequently used as night roosts. They are mostly nocturnal, but individuals have been caught as early as half an hour after sunrise. While reproductive females roost during summer, non-reproductive females and males roost alone or in small groups nearby. Some individuals have lived for up to 22 years.
Status in Morro Bay area: Cover a wide range, but are very uncommon throughout California. Specific roosting colonies are unknown, but due to their wide variety of preferred habitat there may be night and maternal roosts scattered locally throughout the Morro Bay area.
Threats: This species is particularly vulnerable to habitat destruction or alteration as it often roosts at ground level. It has been placed on the California Dept. of Fish and Game Watch List due to its rarity and apparent association with forested habitat, and it may be affected by some forest management practices. Other threats include bridge and building reconstruction, highway construction, drought, and other modifications that impact roosting and foraging habitats. Agricultural pesticides that affect bats and their prey may threaten this species in the Morro Bay area, and habitat loss or alteration due to construction, development, and other human induced factors are a potential threat as well.

DISTRIBUTION *of* LONG-EARED MYOTIS (*Myotis evotis*)

Sources:
Andreano, L., J. Beaulieu, and M. Walgren. 2006. Terrestrial Mammals of the Estero Bay Area. Morro Bay National Estuary Program, Morro Bay, California, and California Department of Parks and Recreation, San Luis Obispo Coast District, San Simeon. 14 pp.
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WESTERN SMALL-FOOTED MYOTIS
Myotis ciliolabrum

Adult Western Small-footed Myotis. Source: ©Merlin D. Tuttle, Bat Conservation International, www.batcon.org (Used With Permission).

Adult Western Small-footed Myotis. Source: Kristi Dubois, Montana Fish, Wildlife & Parks.

Sensitive Status

Federal: None.
State: G5/S2S3.
Other: Western Bird Working Group Medium Priority; Bureau of Land Management Sensitive Species; IUCN Least Concern.

Breeding Period: Mating occurs in fall to early winter, followed by delayed fertilization (ovulation and fertilization occur from late April to early May).
Habitat: Occupy rocky areas in coniferous forest, deserts, chaparral, and riparian zones. Most common above pinyon-juniper forest. Roost in cliff and rock crevices, erosion cavities, buildings, concrete overpasses, caves, and mines.
Maternal Roosting: Individuals roost singly or sometimes in small groups, and do not form large nursery or other colonies. *Litter Size:* A single young is born in May to July.
Range: Across western half of North America from British Columbia, Alberta, and Saskatchewan in Canada, throughout most of western United States and into central Mexico.
Identification: A small bat, forearm length 30 to 34 mm (1.2 to 1.3 in), with short black ears, small feet, and a keeled calcar. Dorsally light to golden brown with a slight glossy sheen to the fur. The face is frequently black, and the ears scarcely extend beyond the tip of the snout when laid forward. Differs from California Myotis (*Myotis californicus*) by having a longer, broader, and flatter skull with a gradual slope from the cranium to rostrum, and is a more robust bat overall.
Life History: Forage in the early evening, feeding on various small insects including flies, beetles, moths, and ants. Like many bats, copulation takes place in the fall and sperm is stored in the female's body over winter during hibernation. In spring the female ovulates and fertilization occurs.
Status in Morro Bay area: Specific roosting sites in the area are unknown. Due to their secluded nocturnal nature, lack of adequate sightings is not necessarily a sign of absence. They occupy a wide range in California, and possibly dwell in preferred habitat throughout the Morro Bay area.
Threats: Specific threats to this species are unknown. It is among America's least-studied animals, and there is a lack of information on population trends, roosting and foraging requirements, and the use and acceptance of bat gates. Current potential threats in the Morro Bay area include agricultural pesticides that may affect bats and their prey, and habitat loss or alteration due to construction and development. In general, the long-term persistence of North American bat species are threatened by loss of clean open water, modification or destruction of roosting and foresting habitat, and disturbance or destruction of hibernacula.

DISTRIBUTION *of* WESTERN-SMALL FOOTED MYOTIS (*Myotis ciliolabrum*)

Sources:
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Bogan, M.A., E.W. Valdez, and K.W. Navo. 2005. Western Small-footed Myotis (*Myotis ciliolabrum*). Western Bat Working Group Species Accounts. 23 November 2009 <http://www.wbwg.org/speciesinfo/species_accounts/species_accounts.html>.
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HARBOR SEAL
Phoca vitulina


Harbor Seal along coast of San Simeon, California.

Sensitive Status
Federal: Marine Mammal Protection Act.
State: None.
Other: IUCN Least Concern.

Breeding Period: April to June.
Habitat: Usually found hauled out on rocks in near-shore coastal waters. Also often found on undisturbed rocky shores, sandy beaches, bays, mudflats, and estuaries.
Reproduction: Mating and birth takes place in the water. *Litter Size:* Usually only one pup, typically with dark fur. If born prematurely, pups may retain a whitish lanugo coat that is usually lost before birth.
Range: North of the equator in Atlantic and Pacific Oceans. Ranging from Alaska to Baja California in the northwest Pacific.
Identification: Harbor Seals reach 1.2 to 1.8 meters (4 to 6 feet) in length and weigh up to 136 kg (300 lbs), with males slightly larger than females. Their coats are silver-gray to black or brown in color and may be spotted with irregular pale rings or with dark splotches. They are true seals, meaning they lack external ear flaps and have short forelimbs, which results in flopping along on their bellies while on land. They have short, concave dog-like snouts and are often described as having a banana-shaped profile while hauled out on land, keeping their head and rear flippers elevated.


Harbor Seal haul-out along coast of San Simeon, California.

Life History: Harbor Seals spend about half their time in water and half on land, and will sometimes sleep in the water. Although they can dive to 457 meters (1,500 feet) for up to 40 minutes, they typically dive much shallower and for only three to seven minutes. They feed on bivalves, crabs, squid, octopus, and fish. Pups are born from March to April in California, and though they can swim at birth, they sometimes ride on their mother's back when tired. Pups make a moaning noise that sounds like "maaaa" and are weaned after about four weeks. Adults usually breed every year, and may live for 25 to 30 years.
Status in Morro Bay area: Common throughout coastal shores of the entire Morro Bay area. Appear regularly in water and along shoreline within the bay and estuary.
Threats: The Harbor Seal population of California was 40,000 in 1997, and the total population in the eastern north Pacific is currently estimated to be 330,000. Harbor Seal populations declined in the past from hunting, and they are currently vulnerable to coastal development and human disturbances. If disturbed or approached too closely they rush into water, and if bothered too often they may completely abandon favorite haul-out sites or even their pups. Other threats include incidental capture in fishing gear, boat strikes, oil spills, chemical contaminants, and other pollution. There is also a problem with Harbor Seal pups being unnecessarily orphaned. Every year people pick up pups on the beach thinking they are abandoned when usually the mother is actually out hunting or watching nearby. Such pups are then at further risk from disease while being taken care of because they are unable to receive the needed antibodies from their mother's milk.

DISTRIBUTION *of* HARBOR SEAL – *Phoca vitulina*

Sources:
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AMERICAN BADGER
Taxidea taxus


Adult American Badger. Source: California Department of Fish and Game.

Sensitive Status
Federal: None.
State: G5/S4; Watch List Species.
Other: IUCN Least Concern.

Breeding Period: August to January.
Habitat: Found primarily in foothills bordering valleys, but also found in farmlands, grasslands, deserts, and open marshy areas.
Nesting: Create an extensive burrow system or sometimes use abandoned burrows of other animals such as foxes, in which they bear young. *Litter Size:* Usually 1 to 4 (5) pale buff-colored young, typically born in March or April.
Range: From northern Alberta southward to southern Mexico, ranging from the Pacific Coast eastward through Ohio. American Badgers used to occur throughout most of California with the exception of humid coastal forests of northwestern Del Norte and Humboldt Counties.
Identification: A medium sized carnivore, averaging 56 to 83 cm (22 to 33 in), with males larger than females. They have a low thickset body, very large claws, and short dark colored legs. American Badgers have a black and white striped face pattern and long coarse fur that is gray above and may be mixed with white, brown, buff, rust, or orange.
Life History: American Badgers sleep through most of winter, becoming active on warmer days. They prey primarily on ground squirrels and gophers, but will also forage on a variety of other animals including mice, woodrats, reptiles, birds and their eggs, bees, and other insects. Red-tailed Hawks and coyotes will often hover around a foraging badger in an attempt to snatch prey that may flee from them.
Status in Morro Bay area: American Badgers occur in grazed grassland, coastal sage scrub, dune scrub, and oak woodlands throughout the Morro Bay area. They have been recorded in grassland at the northern end of South Bay Blvd. east of Highway 1 in 1980 (ARMC 2010) and in 1994 (ENDD 1996), and Hazard Canyon 8 km (5 miles) south of Morro Bay in 1963 (ARMC 2010). In July of 2008, at least four fresh badger burrows were documented along a hillside east of Warden Lake, about 2.8 km (1.75 miles) east of Los Osos (CNDDB 2009).
Threats: Agricultural and urban development are the primary causes for decline and extirpation of American Badger populations in California. Rodent and predator poisoning pose double threats through direct and secondary poisoning of American Badgers. Shooting and trapping of American Badgers for animal "control" is another source of mortality, with U.S. Fish and Wildlife Service taking over 4,000 American Badgers in California from 1966 to 1976 (Lee, 1977), and trapping for the fur trade has also led to the decimation of local populations throughout California in the past. Potentially threatened in the Morro Bay area by agricultural expansions and poisoning from rodent control practices.

DISTRIBUTION *of* AMERICAN BADGER (*Taxidea taxus*)

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Kucera, T.E. 1998. Badger, *Taxidea taxus*. Pp. 158 in B.C. Bolster (ed.), Terrestrial mammal species of special concern in California (draft). California Department of Fish and Game, Sacramento. 291 pp. 18 November 2009 <http://www.dfg.ca.gov/wildlife/nongame/ssc/docs/mammal/MSSC-1998_final_with_maps.pdf>.
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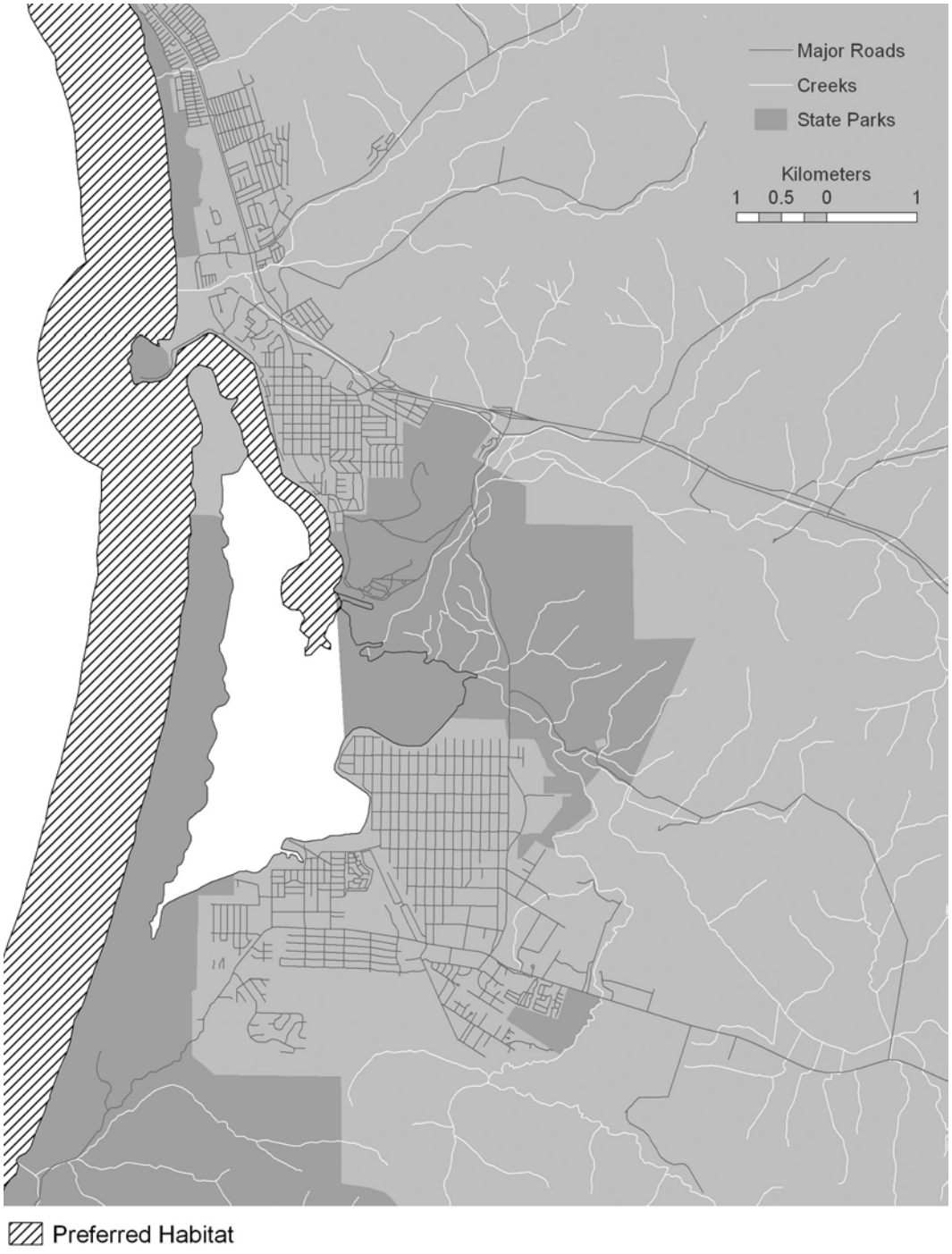
SOUTHERN SEA OTTER
Enhydra lutris nereis


Adult Southern Sea Otter. Source: U.S. Fish and Wildlife Service.

Sensitive Status
Federal: Threatened, January 14, 1977; Marine Mammal Commission Species of Special Concern; Marine Mammal Protection Act.
State: G4T2/S2; Fully Protected Species.
Other: IUCN Endangered; CITES I.

Breeding Period: Breed throughout the year, with a peak from late February to early April.
Habitat: Generally occur in shallow coastal waters associated with kelp beds. Occupying hard and soft sediment marine habitats from the littoral zone to depths of less than 100 meters within protected bays to exposed outer coasts. Most individuals occur between the shoreline and waters not more than 20 meters deep.
Reproduction: Birth usually takes place in the water and the mother grooms the pup until its fur retains so much air that it floats and cannot dive. *Litter Size:* One (rarely 2) pup with a thick coat of fur.
Range: Currently occurs from Half Moon Bay of San Mateo County to Point Conception of Santa Barbara County along the central and southern coast of California.
Identification: Sea Otters are not only the smallest species of marine mammals in North America, 1.2 to 1.4 meters (4 to 4.6 feet), but are also the only marine mammals to have plush fur, paw-like hands, and flipper-like feet. Their fur is dark brown to reddish brown or black, and in older individuals the head, neck, and shoulders often become grizzled. The tail is less than one-third the body length, dorso-ventrally flattened, and with uniform thickness from base to tip.
Life History: Sea Otter fur consists of dense underfur that may reach densities of 100,000 or more follicles per square centimeter. Insulation from cold seawater is provided entirely by air trapped in such dense fur. Sea Otters typically float on their back while handling invertebrate prey on their belly, and are one of few mammals that use a tool to eat, utilizing rocks to break open shellfish and dislodge abalone. They forage solitarily, but will often rest and socialize in groups called “rafts”. Mating and birth likely occurs every other year, and a single pup is born after a gestation period of six to nine months, which includes a period of delay in implantation.
Status in Morro Bay area: Observed occasionally throughout the entire coastline of the Morro Bay area, typically within 1 km (0.6 miles) of shoreline.
Threats: The most significant threat to Sea Otters is oil spills. Past spills, such as the Exxon Valdez oil spill of 1989, have led to thousands of Sea Otter deaths and continue to threaten populations today. Sea Otters are particularly vulnerable to oil spills as they rely on air retained in their fur to keep warm. With oil contamination, their fur can no longer retain air and they quickly die of hypothermia. Other pollution and incidental take in fisheries have also been recognized as substantial problems. Poaching for food and/or fur also caused past declines. Predation by Orcas and sharks are yet another threat, along with disease, and in a 2003 study (Kreuder et al.) it was found that 63.8 percent of 3,105 beach cast Sea Otter carcasses had died primarily from diseases (due to parasites, bacteria, fungi, or unspecified causes).

DISTRIBUTION *of* SOUTHERN SEA OTTER (*Enhydra lutris nereis*)



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NORTHERN FUR SEAL
Callorhinus ursinus

Sensitive Status
Federal: Marine Mammal Protection Act.
State: G3/S1.
Other: IUCN Vulnerable.


Northern Fur Seal bull. Source: Rolf Ream, NOAA National Marine Mammal Laboratory.


Northern Fur Seal pups. Source: Rolf Ream, NOAA National Marine Mammal Laboratory.

Breeding Period: Mid-June to Late October.
Habitat: Open ocean for foraging and rocky beaches for reproduction.
Reproduction: Females give birth at rookery sites on rocky and occasionally sandy beaches. *Litter Size:* A single pup is born, black in color.
Range: Throughout the Pacific Rim from Japan to the Channel Islands of California. Breed and pup mostly on the shores of Pribilof and Commander Islands in the Bering Sea. Smaller rookeries occur on the Kuril Islands north of Japan, Robben Island in the Sea of Okhotsk, and on San Miguel Island of southern California.
Identification: Northern Fur Seal males are much larger than females, weighing 175 to 275 kg (386 to 606 lbs), compared to 30 to 50 kg (66 to 120 lbs) females. Both sexes have a short head with a very sharply pointed nose. They are distinguished from Guadalupe Fur Seals by having fur that forms a straight line at the base of the foreflipper, instead of extending to a point. Females are brown and males turn darker as they age, sometimes appearing black, especially when wet. Pups are black when born, and molt to a silvery color in late summer, becoming golden brown over winter.
Life History: Northern Fur Seals spend about 80% of their lives foraging in the open ocean, coming to shore only to breed. They feed on small schooling fish such as herring, walleye pollock, hake and anchovy, and squid. They have developed a behavior known as jug handling, which involves keeping their front and rear flippers out of the water while bobbing on the surface. Adult males establish territories in late May to early June, and aggressively guard and herd 40 or more females. Pregnant females arrive at rookeries in mid-June to early July and give birth two days later. Adult males do not eat while maintaining territories, and females alternate between feeding at sea and nursing on shore. While females are foraging at sea, pups play and sleep in groups with other pups known as "puppy pods".
Status in Morro Bay area: These pelagic seals almost never haul out on mainland shore outside of the breeding season unless they are sick. They are uncommonly seen in open ocean throughout the Morro Bay area during non-breeding winter months.
Threats: Early Northern Fur Seal declines were caused by commercial harvest for their luxurious pelts. Today less than one million occur throughout the world and numbers are continuing to decline. They face a variety of threats including climate change, pollution, predation, changes in quantity and quality of prey, entanglement in marine debris, habitat alteration, and disturbance from boats and humans. Of these threats, changes in quantity of prey (mostly due to commercial fishing) and possible increase of predation by Orcas are thought to be the most significant cause of current decline.

DISTRIBUTION *of* NORTHERN FUR SEAL (*Callorhinus ursinus*)

Sources:
International Union for Conservation of Nature and Natural Resources (IUCN). 2008. The IUCN Red List of Threatened Species. 25 March 2009 <http://www.iucnredlist.org/>.
Kays, R.W., and D.E. Wilson. 2002. Mammals of North America. Princeton University Press, Princeton, NJ. 240 pp.
Marine Mammal Center, The. 2009. Northern Fur Seal. Education, Marine Mammal Information. 11 November 2009 <http://www.marinemammalcenter.org/learning/education/pinnipeds/nofurseal.asp>.
Marine Mammal Commission and NOAA Fisheries Service. 2007. The Marine Mammal Protection Act of 1972. Title I, Section 101-120.
National Oceanic and Atmospheric Administration (NOAA). 2009. Northern Fur Seal (*Callorhinus ursinus*). NOAA Fisheries, Office of Protected Resources. 18 November 2009 <http://www.nmfs.noaa.gov/pr/species/mammals/pinnipeds/northernfurseal.htm>.

STELLER SEA LION
Eumetopias jubatus

Sensitive Status

Federal: Threatened, May 5, 1997; Marine Mammal Commission Species of Special Concern; Marine Mammal Protection Act.
State: G3/S2.
Other: IUCN Endangered.


Steller Sea Lion bull and pups. Source: NOAA National Marine Mammal Laboratory.


Steller Sea Lions hauled out on rocks off Amak Island. Source: U.S. Fish and Wildlife Service.

Breeding Period: May to August.
Habitat: Prefer cold temperatures in sub-arctic waters of the North Pacific Ocean. Usually haul out on gravel, rocky or sandy beaches, ledges, and rocky reefs. In the Bering and Okhotsk Sea they will occasionally haul out on ice.
Reproduction: Mating takes place in water and on land and pups are born on offshore islands. *Litter Size:* A single pup, born with dark brown fur that molts to a lighter color after three months.
Range: Throughout the North Pacific Rim from Japan to central California. Breed along the North Pacific Rim from Aña Nuevo Island in central California to the Kuril Islands north of Japan. The greatest concentration of breeding grounds is on the Aleutian Islands and Gulf of Alaska.
Identification: Sometimes confused with California Sea Lions, but Steller Sea Lions are much larger, males weigh 500 to 1,120 kg (1,102 to 2,469 lbs), and are lighter in color, with light tan to reddish brown fur. They have a blunt face with a bear-like head and a short straight snout. Adult males lack a visible crest on the forehead, which is seen in adult male California Sea Lions. Males have long coarse hair on chest, neck, and shoulders. Females lack this long hair and are much smaller in size than males.
Life History: Steller Sea Lions forage in near shore and pelagic waters, feeding on a variety of fishes, invertebrates, and occasionally other seals and sea lions. They are colonial breeders, with adult males establishing and maintaining territories for up to two months during the breeding season. While aggressively defending territory for this one to two month time period, mature males go without eating. Males mate with many females per breeding season, and females usually mate again within two weeks after giving birth, which occurs from mid-May to mid-July. Females use smell and distinct vocalizations to recognize and create strong social bonds with their newborn pups, in which they typically nurse for one year.
Status in Morro Bay area: Steller Sea Lions used to breed as far south as the Channel Islands, and would move north after breeding. Sightings are rare in near-shore waters of the Central Coast, and there are no known haul outs or rookeries in the area.
Threats: Steller Sea Lion populations have declined by 80% in the last 30 years and today their population is about 40,000, with 500 living in California. In the 1800's they were hunted for food, fur, oil, and various other products. In the early 1900's, fishermen killed Steller Sea Lions as they blamed them for stealing their fish. Today prey depletion by commercial fisheries is perhaps the most major threat to this species and other studies show that predation is also a major factor of decline. Other human induced threats include boat strikes, entanglement in nets, pollutants, habitat degradation, illegal hunting, and offshore oil and gas exploration.

DISTRIBUTION *of* STELLER SEA LION (*Eumetopias jubatus*)

Sources:
International Union for Conservation of Nature and Natural Resources (IUCN). 2008. The IUCN Red List of Threatened Species. 25 March 2009 <http://www.iucnredlist.org/>.
Kays, R.W., and D.E. Wilson. 2002. Mammals of North America. Princeton University Press, Princeton, NJ. 240 pp.
Marine Mammal Center, The. 2009. Steller Sea Lion. Education, Marine Mammal Information. 11 November 2009 <http://www.marinemammalcenter.org/learning/education/pinnipeds/stellersea.asp>.
Marine Mammal Commission. 2009. Species of Special Concern. 18 November 2009 <http://mmc.gov/species/specialconcern.html>.
Marine Mammal Commission and NOAA Fisheries Service. 2007. The Marine Mammal Protection Act of 1972. Title I, Section 101-120.
National Oceanic and Atmospheric Administration (NOAA). 2009. Steller Sea Lion (*Eumetopias jubatus*). NOAA Fisheries, Office of Protected Resources. 11 November 2009 <http://www.nmfs.noaa.gov/pr/species/mammals/pinnipeds/stellersealion.htm>.
United States Fish and Wildlife Service. 2004. Code of Federal Regulations. Department of the Interior. Title 50, Part 17.11.

CALIFORNIA SEA LION
Zalophus californianus

Sensitive Status
Federal: Marine Mammal Protection Act.
State: None.
Other: IUCN Least Concern.


California Sea Lion female at Morro Strand State Beach, Morro Bay, California. Source: Michael Baird, Wikimedia Commons.


Hundreds of California Sea Lions sun bathing at Pier 39 in San Francisco. Source: Reywas92, Wikimedia Commons.

Breeding Period: May to August.
Habitat: Eastern North Pacific Ocean in shallow coastal and estuarine waters. Prefer sandy beaches for haul out sites, but will also haul out on marina docks, jetties, and buoys in California.
Reproduction: Mating takes place in the water and on land in all substrates. *Litter Size:* A single pup, born dark but quickly molting into a lighter blond pelage similar in color to females.
Range: Vancouver Island, B.C. to the southern tip of Baja California. Colonial breeding occurs mostly on offshore rocks and islands from the Channel Islands south to Mexico. Found in many areas along the California coast during the non-breeding season.
Identification: Have a unique "dog-like" face, ranging in color from chocolate brown in males to a lighter, golden brown in females. They walk on flippers, unlike seals, and often arch their neck back while hauled out. Males are larger, up to 2.5 meters (8 feet) long and 400 kg (882 lbs), darker and have a thicker neck compared to females, and will also develop a white haired crest on their forehead.
Life History: California Sea Lions are known for their playfulness, acrobatic tricks and noisy barking, and are commonly seen at aquariums and zoos. They are social animals, forming groups of several hundred individuals onshore (as seen in the above photo at Pier 39). California Sea Lions are opportunistic eaters, feeding on octopus, squid, rockfish, mackerel, herring, and even small sharks. They are very agile swimmers and are sometimes seen jumping out of the water and even "surfing" waves presumably to speed up there swimming. Males are polygamous and may mate with up to fourteen females, and defend their territories with aggressive displays and vocalization. Most pups are born from May through July and females are ready to mate again in three weeks after giving birth.
Status in Morro Bay area: Occur throughout coastal shores of the entire Morro Bay area. Appear commonly in water and along shoreline within the bay and estuary.
Threats: Commercial harvest in the 1800's and early 1900's likely reduced numbers of California Sea Lions in the turn of the century. The population has increased dramatically after commercial fishing was restricted in the 1940's. California land populations jumped from an estimated 1,000-1,500 individuals in the late 1920's, to an estimated 10,000 in the 1950's, to a population that is now near 300,000. Since the passage of the Marine Mammal Protection Act (MMPA) in 1972, the California Sea Lion population off the Pacific Coast of the United States has increased steadily at an average annual rate of more than 5%. Although the population is now considerably large and may be greater than any historical level, there is no evidence they have reached their optimal sustainable population level, which is the management goal mandated by the MMPA. Recent mortalities are linked to bio-toxins as a result of harmful algal blooms, and they are still found illegally shot and caught in gill nets and other marine debris.

DISTRIBUTION *of* CALIFORNIA SEA LION (*Zalophus californianus*)

Sources:
International Union for Conservation of Nature and Natural Resources (IUCN). 2008. The IUCN Red List of Threatened Species. 25 March 2009 <http://www.iucnredlist.org/>.
Kays, R.W., and D.E. Wilson. 2002. Mammals of North America. Princeton University Press, Princeton, NJ. 240 pp.
Marine Mammal Center, The. 2009. California Sea Lion. Education, Marine Mammal Information. 11 November 2009 <http://www.marinemammalcenter.org/learning/education/pinnipeds/casealion.asp>.
Marine Mammal Commission and NOAA Fisheries Service. 2007. The Marine Mammal Protection Act of 1972. Title I, Section 101-120.
National Oceanic and Atmospheric Administration (NOAA). 2009. California Sea Lion (*Zalophus californianus*). NOAA Fisheries, Office of Protected Resources. 11 November 2009 <http://www.nmfs.noaa.gov/pr/species/mammals/pinnipeds/californiasealion.htm>.
Walgren, M., L. Andreano, J. Beaulieu, S. Christopher, and C. Jackson. 2005. Resource inventory for Morro Strand State Beach. California Department of Parks and Recreation, San Luis Obispo Coast District, San Simeon.
Walgren, M., A.E. Sims, L. Andreano, O. Hernandez, T. Edell, and K. Wilkins. 2008. San Luis Obispo Coast District north coast acquisitions natural resource inventory. California Department of Parks and Recreation, San Luis Obispo Coast District, San Simeon.

BLOCHMAN'S LEAFY DAISY
Erigeron blochmaniae

Sensitive Status
Federal: None.
State: G2/S2.2.
CNPS: 1B.2; Bureau of Land Management Sensitive Species.

Life Form: Rhizomatous perennial herb.
Blooming Period: July to August.
Habitat: Stabilized coastal sand dunes in coastal dune scrub and coastal scrub habitats.
Range: Endemic to coastal dunes of San Luis Obispo and northern Santa Barbara Counties.
Identification: A 40 to 80 cm (16 to 32 in) tall herbaceous perennial that grows from a woody caudex or rhizome. Its linear leaves are cauline, evenly spaced, and slightly folded, which makes them appear grooved. The inflorescence is composed of flat-topped flower heads with densely hairy/glandular bracts and ray flower petals are purplish blue to white. The above-ground growth dies back each year and re-sprouts in spring from underground rhizomes.
Life History: Blochman's leafy daisy is also known as Blochman's erigeron, and was referenced as *E. foliosus* var. *blochmaniae* in past literature.
Status in Morro Bay area: Locally common to stabilized dunes of Montaña de Oro State Park, along with a few small populations at Morro Strand State Beach. The only known inland population consists of about 6 individuals at southeastern Morro Bay State Park near Los Osos Middle School (CDPR staff).
Threats: Threatened mostly by depletion of habitat from coastal development. Also threatened by invasive plants and off-road vehicles. Vulnerable to ice plant (*Carpobrotus* spp.) invasion in the Morro Bay area, and future populations are potentially threatened by sea-level rise due to global climate change.


Erigeron blochmaniae in flower. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.


Developing flower heads of *Erigeron blochmaniae*. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.


Stem and leaves of *Erigeron blochmaniae*.

DISTRIBUTION *of* BLOCHMAN'S LEAFY DAISY (*Erigeron blochmaniae*)

Sources:
Bureau of Land Management (BLM). 2004. List of California-BLM sensitive plants, Updated April 2004. 20 March 2009 <www.blm.gov/ca/pdfs/pa_pdfs/biology_pdfs/SensitivePlants.pdf>.
Calflora: Information on California plants for education, research and conservation. [web application]. 2010. Berkeley, California: The Calflora Database [a non-profit organization]. 19 January 2010 <http://www.calflora.org/>.
California Native Plant Society (CNPS). 2010. Inventory of rare and endangered plants (online edition, v7-10a). California Native Plant Society, Sacramento. 19 January 2010 <http://www.cnps.org/inventory>.
Consortium of California Herbaria (CCH). 2008. Data provided by participants of the Consortium of California Herbaria. Regents of the University of California. 19 January 2010 <ucjeps.berkeley.edu/consortium/>.
Hickman, J.C. (ed.). 1996.The Jepson Manual: Higher Plants of California. University of California Press, Berkeley and Los Angeles. 1400 pp.
Hoover, R.F. 1970. The Vascular Plants of San Luis Obispo County, California. University of California Press. Berkeley. 350 pp.
Munz, P.A. and D.D. Keck. 1973. A California Flora with Supplement. University of California Press, Berkeley and Los Angeles. 1681 pp. and 224 pp.
Walgren, M., J. Beaulieu, and L. Andreano. 2006. Native Flora of Estero Bay (second edition). Morro Bay National Estuary Program, Morro Bay, California, and California Department of Parks and Recreation, San Luis Obispo Coast District, San Simeon. 181 pp.

COULTER'S GOLDFIELDS
Lasthenia glabrata coulteri

Sensitive Status
Federal: None.
State: G4T3/S2.1.
CNPS: 1B.1; Bureau of Land Management Sensitive Species.

Life Form: Annual herb.
Blooming Period: April to May (February to June).
Habitat: Typically associated with low-lying alkali habitats. Occurring in coastal salt marsh, vernal pool, freshwater wetland, and wetland-riparian habitats.
Range: In scattered counties mostly throughout central and southern California, south to Baja California, Mexico. Also occurs along the eastern and northern coast of Santa Rosa Island off the coast of southern California.
Identification: A small, less than 60 cm (24 in) tall, annual herb, with opposite linear to awl-shaped leaves and many yellow ray and disk flowers. Its fruit is less than 3.5 mm in size, club or egg-shaped, and with warty-hairs.
Life History: This species was once considered a variety, *Lasthenia glabrata* var. *coulteri*, instead of a subspecies. The genus *Lasthenia* is Greek for the female pupil of Plato, and *glabrata* is Latin for smooth, which likely refers the plants stems, leaves, and fruit. Population sizes of *L. glabrata coulteri* vary considerably year to year, and are often difficult to locate in dry years or after recent disturbances.
Status in Morro Bay area: Uncommon. Current locations are thought to be limited to a single population along the southern edge of the Morro Bay Estuary in Sweet Springs Nature Preserve of Los Osos Baywood Park (CDPR staff). Documented as locally common at Sweet Springs in 1939, with collections from 1981 and '82, along with sightings in 1999 (CCH 2008, CNDDB 2009, Robert F. Hoover Herbarium 2010).
Threats: Known to have declined greatly by 1966, *Lasthenia glabrata coulteri* is seriously threatened by agricultural development and urbanization. Many local populations are so small that any impacts such as foot traffic, flower picking, etc., could also be significant threats. Continual years of drought are additionally a potential threat, as it may take *L. glabrata coulteri* several years to recover even after a single dry season.


Population of *Lasthenia glabrata coulteri*. Source: © 2007 Michael Walgren (Used With Permission).


Flowers of *Lasthenia glabrata coulteri*. Source: © 2007 Michael Walgren (Used With Permission).

DISTRIBUTION *of* COULTER'S GOLDFIELDS (*Lasthenia glabrata coulteri*)

Sources:
Bureau of Land Management (BLM). 2004. List of California-BLM sensitive plants, Updated April 2004. 20 March 2009 <www.blm.gov/ca/pdfs/pa_pdfs/biology_pdfs/SensitivePlants.pdf>.
Borror, D.J. 1988. Dictionary of Word Roots and Combining Forms. Mayfield Publishing Company, Mountain View, CA. 134 pp.
Calflora: Information on California plants for education, research and conservation. [web application]. 2010. Berkeley, California: The Calflora Database [a non-profit organization]. 19 January 2010 <http://www.calflora.org/>.
California Native Plant Society (CNPS). 2010. Inventory of rare and endangered plants (online edition, v7-10a). California Native Plant Society, Sacramento. 19 January 2010 <http://www.cnps.org/inventory>.
California Natural Diversity Database (CNDDB). 2009. Biogeographic Data Branch, California Department of Fish and Game. July 04, 2009.
Consortium of California Herbaria (CCH). 2008. Data provided by participants of the Consortium of California Herbaria. Regents of the University of California. 19 January 2010 <ucjeps.berkeley.edu/consortium/>.
Hickman, J.C. (ed.). 1996.The Jepson Manual: Higher Plants of California. University of California Press, Berkeley and Los Angeles. 1400 pp.
Robert F. Hoover Herbarium. 2010. California Polytechnic State University, San Luis Obispo.

JONES' LAYIA
Layia jonesii

Sensitive Status

Federal: USDA Forest Service Sensitive Species.
State: G1/S1.1.
CNPS: 1B.2; Bureau of Land Management Sensitive Species.

Life Form: Annual herb.
Blooming Period: March to May.
Habitat: Typically grows along slopes of valley and foothill grassland on open clay and/or serpentine soil. Also found in open areas of coastal scrub and chaparral.
Range: Endemic to coastal San Luis Obispo County, California.
Identification: A 7 to 55 cm (2.8 to 22 in) tall annual wildflower that grows on a glandular yet unscented stalk. Its linear to oblanceolate leaves are less than 7 cm (2.8 in) long and more or less fleshy. Lower leaves are generally lobed at greater than halfway to the midvein. Flowers are borne on a 1 to 8 cm (0.4 to 3 in) long stalk, and have a widely urn-shaped involucre. Its 13 to 27 ray flowers are yellow with white tips, while its numerous (35 to 100) disk flowers are yellow with purple anthers.
Life History: *Layia jonesii* is similar in appearance to common tidy-tips (*Layia platyglossa*), and is perhaps overlooked and under-reported in the area due to general miss identifications. *Layia platyglossa* normally has a single series of 5 to 18 ray flowers that are 3 to 20 mm (0.1 to 0.8 in) long, while *Layia jonesii* has two series of 13 to 27 ray flowers that are 5 to 10 mm (0.2 to 0.4 in) long. *Layia jonesii* is also known as Jones' tidytips, and its genus name, *Layia*, is derived from George T. Lay, an early 19th century English plant collector.

Layia jonesii. Source: © 1980 California Native Plant Society (Used With Permission).

Layia jonesii. Source: © 1980 California Native Plant Society (Used With Permission).

Status in Morro Bay area: Very uncommon. Current populations within the area are unknown. There are two historic specimen records within the general area from the Robert F. Hoover Herbarium of Cal Poly. One was collected 4.8 km (3 miles) northwest of the town of Morro Bay near the ocean in 1947, and the other was from San Bernardo Creek just east of Morro Bay in 1969; both of which were collected by Robert F. Hoover. Many other historical records indicate this species presence in the Morro Bay area, dating from as early as 1923 to 1960 (Calflora 2010, CCH 2008, CNDDB 2009).
T**hreats:** Threatened by feral pigs, non-native plants, military activities, grazing, frequent wildfires, and trampling. Local populations in the area may be threatened by non-native plants and grazing. The California Native Plant Society is in need of current information on its distribution and rarity to make further assessments on its status and potential threats.

DISTRIBUTION *of* JONES' LAYIA (*Layia jonesii*)

Sources:
Bureau of Land Management (BLM). 2004. List of California-BLM sensitive plants, Updated April 2004. 20 March 2009 <www.blm.gov/ca/pdfs/pa_pdfs/biology_pdfs/SensitivePlants.pdf>.
Calflora: Information on California plants for education, research and conservation. [web application]. 2010. Berkeley, California: The Calflora Database [a non-profit organization]. 19 January 2010 <http://www.calflora.org/>.
California Native Plant Society (CNPS). 2010. Inventory of rare and endangered plants (online edition, v7-10a). California Native Plant Society, Sacramento. 19 January 2010 <http://www.cnps.org/inventory>.
California Natural Diversity Database (CNDDB). 2009. Biogeographic Data Branch, California Department of Fish and Game. July 04, 2009.
Consortium of California Herbaria (CCH). 2008. Data provided by participants of the Consortium of California Herbaria. Regents o f the University of California. 19 January 2010 <ucjeps.berkeley.edu/consortium/>.
Estero Natural Diversity Database (ENDD) (data). 1996. San Luis Obispo County and Landscape Architecture GIS Lab, California Polytechnic State University. 22 December 2009 <http://midnight.calpoly.edu/gis/data/slo_county/environmental/est_vegetation/est_vegetation.zip>.
Hickman, J.C. (ed.). 1996.The Jepson Manual: Higher Plants of California. University of California Press, Berkeley and Los Angeles. 1400 pp.
Hoover, R.F. 1970. The Vascular Plants of San Luis Obispo County, California. University of California Press. Berkeley. 350 pp.
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Robert F. Hoover Herbarium. 2010. California Polytechnic State University, San Luis Obispo.
USDA Forest Service. 2006. Pacific Southwest Region sensitive plant species by forest. 6 February 2010 <www.fs.fed.us/r5/tahoe/documents/veg/06_sept_22_sensitive_plants.pdf>.

BEACH SPECTACLEPOD
Dithyrea maritima

Sensitive Status
Federal: None.
State: G2/S2.1; Threatened, February 1990.
CNPS: 1B.1.


Inflorescence of *Dithyrea maritima*. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.


Dithyrea maritima on sandspit of Montaña de Oro State Park. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.

Life Form: Perennial herb.
Blooming Period: March to May.
Habitat: Transverse foredunes within approximately 50 to 300 meters (164 to 984 feet) from the surf. Usually found in active foredune areas that are denuded of other vegetation and where sand is relatively unstable.
Range: Restricted to coastal southern California and adjacent Baja California, Mexico. In Los Angeles, Ventura, Santa Barbara and San Luis Obispo Counties, as well as Channel Islands of California. Likely extirpated from Los Angeles County, and Santa Catalina and San Miguel Islands.
Identification: *Dithyrea maritima* is a low growing compact plant with fleshy rounded leaves that have dense, star-like, multi-branched hairs. The stems are less than 20 cm (8 in) in length, and the above ground growth is visible only for a short period of time, while underground rhizomes spread widely throughout the sand. Flowers have white to cream or purplish colored petals that are obscurely veined and curved backward. Its unique twin-fruited seed-pods have two side by side sections, each surrounded by a rim, giving the plant its common name.
Life History: *Dithyrea maritima* is one of two species within the genus *Dithyrea*. The other, *Dithyrea californica*, is an abundant herb native to southwestern United States and northern Mexico. The two species are remarkably different, *D. maritima* being a coastal perennial with spreading rhizomes, and *D. californica* a desert annual with a slender tap-root.
Status in Morro Bay area: Uncommon. Used to be frequent on low sand-dunes nearest the beach from western Morro Bay southward (Hoover 1970). Local populations are currently found along the sandspit of Montaña de Oro State Park. A presence/presence not detected survey was conducted in 2005 to discover new populations and confirm known locations throughout the area (CDPR staff).
Threats: Extirpated from about half its historic range and currently known from fewer than 20 disjunct occurrences. Populations are present in such small numbers that they are rarely reported. The California Native Plant Society lists this species as threatened by trampling from heavy recreational use including foot traffic and vehicles, and invasion by non-native plants. It is threatened in the Morro Bay area mostly from invasive ice plant (*Carpobrotus* spp.) and sand blowouts. Future populations are potentially threatened by global climate change and ocean level rise.

DISTRIBUTION *of* BEACH SPECTACLE POD (*Dithyrea maritima*)

Sources:
California Department of Fish and Game. 2009. California Code of Regulations. Title 14, Section 670.2.
California Native Plant Society (CNPS). 2010. Inventory of rare and endangered plants (online edition, v7-10a). California Native Plant Society, Sacramento. 19 January 2010 <http://www.cnps.org/inventory>.
California Natural Diversity Database (CNDDB). 2009. Biogeographic Data Branch, California Department of Fish and Game. July 04, 2009.
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Munz, P.A. and D.D. Keck. 1973. A California Flora with Supplement. University of California Press, Berkeley and Los Angeles. 1681 pp. and 224 pp.
Walgren, M., J. Beaulieu, and L. Andreano. 2006. Native Flora of Estero Bay (second edition). Morro Bay National Estuary Program, Morro Bay, California, and California Department of Parks and Recreation, San Luis Obispo Coast District, San Simeon. 181 pp.

MARSH SANDWORT
Arenaria paludicola

Sensitive Status
Federal: Endangered, August 3, 1993; USDA Forest Service Sensitive Species.
State: G1/S1.1; Endangered, February 1990.
CNPS: 1B.1.


Flower of *Arenaria paludicola* from Oso Flaco Lake, Arroyo Grande, California. Source: © 2009 Michael Walgren (Used With Permission).


Stand of *Arenaria paludicola* at Sweet Springs Nature Preserve, Los Osos Baywood Park, California. Source: © 2007 Michael Walgren (Used With Permission).

Life Form: Perennial herb.
Blooming Period: May to August.
Habitat: Freshwater marsh and wetland-riparian habitats relatively close to ocean. Typically in open or semi-shaded sites as an emergent species along edges of permanent, slow moving streams and marshes. Generally in sandy, saturated soils with a high organic content. Often associated with rushes (*Juncus* spp.), sedges (*Carex* spp.), cattails (*Typha* spp.), and arroyo willow (*Salix lasiolepis*) in southern California.
Range: Currently known from only one extant wild population at Oso Flaco Lake, and one extant introduced population at Sweet Springs Nature Preserve in San Luis Obispo County, California.
Identification: A perennial green herb, up to one meter (3.3 feet) tall, that is either erect or not, and often supported by surrounding vegetation. Its leaves are 20 to 55 mm (0.8 to 2.2 in) long, more or less lanceolate with narrowly acute tips, and with only one vein. Flowers are white, solitary, and borne on long stalks arising from the leaf axils. The fruit is an ovoid (egg-shaped) to urn-shaped capsule containing 15 to 20 smooth, dark brown seeds.
Life History: Historically known from San Francisco Bay to San Bernardino Valley in California, and from one location in Pierce County, Washington. It has also been reported from Mexico and Guatemala, however collections need further confirmation. In 1993, the only known extant population of *Arenaria paludicola* was in Black Lake Canyon of southwestern San Luis Obispo County, and it was last seen there naturally in 1994. It was reintroduced into Black Lake Canyon in 1995 and 1998, however reintroduction efforts failed, with the last observation of *A. paludicola* in the canyon in 1999. Another failed attempt of introduction occurred at a newly created wetland habitat of Nipomo Native Garden in 2002 and 2003. Plants thrived for a short period of time, but eventually died in 2004. The U.S. Fish and Wildlife Service is currently working to reintroduce/introduce *A. paludicola* populations to additional sites within its historical range in California.
Status in Morro Bay area: Very uncommon to the Morro Bay area. An experimental planting exists at Sweet Springs Nature Preserve in Los Osos. Sixteen of the twenty individuals planted in 2003 remain, and cover an area of approximately 7 meters (23 feet) across (USFWS 2008, CDPR staff).
Threats: Major threats include invasion of non-native plants, changes in hydrology, drought, erosion, urban and agricultural development, and off-road vehicles. Native and non-native plants can be threatening by taking up excessive amounts of water as well as competing for space and other resources. In addition, its very low numbers of individuals and populations put it further at risk of extinction from random naturally occurring events.

DISTRIBUTION *of* MARSH SANDWORT (*Arenaria paludicola*)

Sources:
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CALIFORNIA SEABLITE
Suaeda californica

Sensitive Status
Federal: Endangered, December 15, 1994.
State: G1/S1.1.
CNPS: 1B.1.

Life Form: Evergreen shrub.
Blooming Period: July to October.
Habitat: Occur along margins of coastal salt marsh, bays, coastal strand, and occasionally coastal sea-bluff scrub.
Range: Endemic to coastal California, from Los Osos to Cayucos Point of San Luis Obispo County.
Identification: *Suaeda californica* is a 30 to 80 cm (12 to 32 in) tall, mounded green shrub. Its leaves are 5 to 35 mm (0.2 to 1.4 in) long, subcylindric to flat, and overlapping. Groups of 1 to 5 flowers are scattered throughout the plant, and are surrounded by densely overlapping bracts. Its small, 2 to 3 mm (0.08 to 0.1 in), flowers are radial, lack hairs, and have 3 stigmas. *Suaeda californica* is often confused with *Suaeda esteroa* and *Suaeda taxifolia* from southern California, however its range does not overlap with these plants.
Life History: Formerly known from San Francisco Bay area, and has been re-introduced there today. It is speculated to have once been widespread throughout the coast of northern and central California, and remains from adobe bricks indicate it may once have occurred along the Petaluma River of Sonoma County.
Status in Morro Bay area: Locally common to occasional along margins of the Morro Bay Estuary as well as on coastal bluffs north of Cayucos, from Villa Creek to Los Osos. In 2005, populations were mapped at Morro Bay State Park, sandspit of Montaña de Oro State Park, Morro Strand State Beach, and the Estero Bluffs State Property (outside of study area); with an estimate of 2,590 m^2 (0.64 U.S. acres) of total vegetative cover (Walgren 2005).
Threats: Threats include depletion and alteration of habitat, recreation, erosion, invasion of non-native plants, boat haul-outs, and stochastic events such as high storm wash. In the Morro Bay area it is threatened by storm tides and exotic vegetation, including ice plant (*Carpobrotus* spp.), red gum (*Eucalyptus camaldulensis*), and myoporum (*Myoporum laetum*). Restoration efforts have been ongoing in various State Park properties and are reported in "Walgren 2006".


Inflorescence of *Suaeda californica*. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.


Leaves and stems of *Suaeda californica*. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.


Stand of *Suaeda californica* along the Morro Bay Estuary. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.

DISTRIBUTION *of* CALIFORNIA SEABLITE (*Suaeda californica*)

Sources:

Calflora: Information on California plants for education, research and conservation. [web application]. 2010. Berkeley, California: The Calflora Database [a non-profit organization]. 19 January 2010 <http://www.calflora.org/>.

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CAMBRIA MORNING-GLORY
Calystegia subacaulis episcopalis

Sensitive Status
Federal: USDA Forest Service Sensitive Species.
State: G3T1/S1.2.
CNPS: 1B.2.

Life Form: Rhizomatous herb.
Blooming Period: April to June (July).
Habitat: Typically in grassland and coastal prairie, as well as dry open areas of chaparral, coastal scrub, and cismontane/foothill woodland.
Range: Endemic to outer Coast Ranges of San Luis Obispo and northern Santa Barbara Counties. From the city of San Luis Obispo to San Carpoforo near Ragged Point in San Luis Obispo County, and from a few locations of northwestern Santa Barbara County.
Identification: This morning-glory does not grow as a true vine like most other *Calystegia* species. It has a prostrate, compact growth form with stems up to 20 cm (7.9 in) in length, and white to pale cream-colored flowers. The leaves are triangular shaped, wide, and covered with many small soft appressed hairs (see bottom right photo). Lower leaf base tips are also rounded, which is unlike most other species.
Life History: The general species, *Calystegia subacaulis*, used to be in the genus *Convolvulus*. When the subspecies was first recognized it was considered to be a rare endemic of coastal San Luis Obispo County due to a lack of adequate knowledge about its actual occurrence and range. Dave Hacker (2007, pers. comm.) writes "Its [CNPS] 1B listing may be inappropriate: a result of a lack of understanding of its true frequency and distribution." and a California Native Plant Society (CNPS) 4 listing may be more appropriate (D. Keil 2009, pers. comm., 8 May). Past and present uses of this species, medicinal or otherwise, are unknown.

Calystegia subacaulis episcopalis in grassland of Morro Bay State Park, Morro Bay, California.

Leaves of *Calystegia subacaulis episcopalis* in grassland of San Simeon, California.

Status in Morro Bay area: Locally common in preferred habitat throughout the area. Mostly in grasslands of Morro Bay State Park (MBSP), from Park Ridge trail south to Turri Road. Also occurs in southeastern MBSP near Los Osos Middle School and in Los Osos Oaks Reserve (CDPR staff). It has been officially documented several times in the Morro Bay area in the past (Calflora 2010, CCH 2008), and there are likely numerous undocumented occurrences throughout the area due to its commonness and general similarity in appearance to common morning-glory (*Calystegia macrostegia*).
Threats: Threatened mostly by coastal development and potentially threatened by foot traffic. It is also considered to be declining in numbers due its integration with *Calystegia subacaulis subacaulis*. Other potential threats, which are given by the California Native Plant Society, include alteration of fire regimes, feral pigs, grazing, military activities, non-native plants, off road vehicle use, and pipeline construction.

DISTRIBUTION *of* CAMBRIA MORNING-GLORY (*Calystegia subacaulis episcopalis*)

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USDA Forest Service. 2006. Pacific Southwest Region sensitive plant species by forest. 6 February 2010 <www.fs.fed.us/r5/tahoe/documents/veg/06_sept_22_sensitive_plants.pdf>.

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BETTY'S DUDLEYA
Dudleya abramsii bettinae

Sensitive Status
Federal: None.
State: G3T1/S1.2.
CNPS: 1B.2.

Life Form: Perennial herb.
Blooming Period: May to July.
Habitat: Occurs on bare rocky areas of exposed serpentine in valley and foothill grassland, chaparral, and coastal scrub.
Range: Endemic to coastal San Luis Obispo County, California. Locally common to first ridge west of Cerro Romauldo near the City of San Luis Obispo.
Identification: A small, 10 to 15 mm (0.4 to 0.6 in) wide caudex, clumped and compact succulent with a grayish appearance. It has 10 to 40 leaves, 2 to 7 cm (0.8 to 2.8 in) long by 2 to 7 mm (0.08 to 0.3 in) wide, that are more or less cylindrical with acute tips. Two to fifteen flowers are borne from 0 to 3 branches on a single 5 to 25 cm (2 to 9.8 in) stalk. Its pale yellow petals are fused at the base, and often purple tinged near the tip along with a few purple flecks throughout.
Life History: Betty's dudleya is also known as San Luis Obispo serpentine dudleya and Betty's liveforever. It was referenced as its own species, *Dudleya bettinae*, in past literature. Many *Dudleya* species are endemic to San Luis Obispo County, and further restricted to serpentine rock outcrop such as this one.
Status in Morro Bay area: This plant has yet to be found by the California Department of Parks and Recreation staff in State Parks and other properties throughout the area. It is included here due to potential occurrences, especially in the interior regions of Morro Bay and Montaña de Oro State Parks. There are historical records of Betty's dudleya throughout the Morro Bay area, but specific localities are not presented in the literature (Calflora 2010, CCH 2008, CNDDB 2009, Hoover 1970, Robert F. Hoover Herbarium 2010).
Threats: *Dudleya abramsii bettinae* has a limited range and is known from fewer than ten occurrences today. It is threatened by development and possibly road construction, which includes road cuts on Cal Trans right-of-way in Cambria.


Flowers of *Dudleya abramsii bettinae*. Source: © 2007 Michael Walgren (Used With Permission).


Leaves of *Dudleya abramsii bettinae*. Source: © 2007 Michael Walgren (Used With Permission).

DISTRIBUTION *of* BETTY'S DUDLEYA (*Dudleya abramsii bettinae*)

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Calflora: Information on California plants for education, research and conservation. [web application]. 2010. Berkeley, California: The Calflora Database [a non-profit organization]. 19 January 2010 <http://www.calflora.org/>.
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Robert F. Hoover Herbarium. 2010. California Polytechnic State University, San Luis Obispo, CA.

BLOCHMAN'S DUDLEYA
Dudleya blochmaniae blochmaniae

Sensitive Status
Federal: None.
State: G2T2/S2.1.
CNPS: 1B.1.

Life Form: Perennial herb.
Blooming Period: April to June.
Habitat: Occurs in sea bluff-scrub, coastal scrub, and grassland. Found on open rocky slopes with soils that are often dominated by clay and/or serpentine.
Range: Along the coast of California from northern San Luis Obispo County to northern Baja California, Mexico, below 450 meters (1,476 feet).
Identification: Blochman's dudleya is an easily overlooked plant due to its brief blooming period and very small size, with a caudex length of only 7 to 25 mm (0.3 to 1 in). It has spoon-shaped, fleshy leaves that are no more than 6 cm (2.4 in) long and 1 to 4 mm (0.04 to 0.16 in) wide, with rounded to acute tips. The inflorescence is branched from a 2 to 22 cm (0.8 to 8.7 in) long stalk. Flowers are star-shaped with white petals and have a pink to red keel along the underside.
Life History: Northern and southern populations of this species are genetically distinct. Although individuals live for more than one growing season, the above ground portions dry out, breakdown, and disappear from the area, making the timing of surveys critical.
Status in Morro Bay area: Very uncommon to the area. Currently known from only a few locations at Morro Bay State Park (CDPR staff). A few records indicate this species occurred in the Morro Bay area in the past, however lack specific information about its whereabouts (Calflora 2010, CCH 2008, CNDDB 2009). Although rare, it has the potential to occur in small, local populations throughout the area in preferred habitat.
Threats: Known from less than twenty occurrences in California, and fewer than five in Baja California. Threatened by development, grazing, trampling, exotic plants, and coastal erosion. Threatened in the Morro Bay area by cattle grazing, non-native plants, and possibly erosion.

Flowers of *Dudleya blochmaniae blochmaniae*. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.

Leaves of *Dudleya blochmaniae blochmaniae* in rock outcrop along coast of San Simeon, California.

DISTRIBUTION *of* BLOCHMAN'S DUDLEYA (*Dudleya blochmaniae blochmaniae*)

Sources:
Calflora: Information on California plants for education, research and conservation. [web application]. 2010. Berkeley, California: The Calflora Database [a non-profit organization]. 19 January 2010 <http://www.calflora.org/>.
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MORRO MANZANITA
Arctostaphylos morroensis

Sensitive Status
Federal: Threatened, December 15, 1994.
State: G2/S2.2.
CNPS: 1B.1.

Life Form: Evergreen shrub.
Blooming Period: December to March.
Habitat: Inland coastal dunes of maritime chaparral in Baywood fine sands.
Range: Endemic to southern Morro Bay extending to just south of Hazard Canyon, Montaña de Oro State Park, San Luis Obispo County.
Identification: A low spreading to erect, 1 to 4 meter (3.3 to 13 feet) tall shrub with shaggy rough, dark gray to brown bark, lacking a basal burl. The leaves are petioled with a dark green, more or less shiny upper surface, and a gray to tomentose lower surface. It has white flowers that are often tinged pink. Flowers grow in a panicle and have dense white hairy ovaries.
Life History: In general, Native Americans and early settlers used manzanitas in the past for food. The Spanish preferred green berries (as seen in top right photo) for jellies and drinks, whereas Native Americans typically collected ripe fruit (as seen in center right photo). Some tribes ground manzanita seeds into flour, while others used the leaves to make a wash or lotion for poison oak, a poultice for sores, or a drink for headaches. The wood has also been used in the past for making pipes and utensils. Various small mammals and birds are drawn to manzanita berries to feed, and the dense foliage also provides them with shelter and protection. Manzanita is also considered to be a valued erosion retardant.
Status in Morro Bay area: Locally common throughout southern portions of Los Osos in Baywood fine sands, occurring in Los Osos Oaks Reserve, Montaña de Oro State Park, and southeastern Morro Bay State Park near Los Osos Middle School. In addition to State Park lands, it is locally common to the Elfin Forest Natural Preserve (managed by Small Wilderness Area Preservation) and scattered in a few locations throughout residential Los Osos and Baywood Park. Populations within Montaña de Oro State Park were verified and mapped to detail in January of 2009 (CDPR staff).
Threats: In the Los Osos area, there was estimated to be 142 hectares (350 U.S. acres) as of 1996. Urbanization, alteration of fire regimes and invasion of non-native plant species, especially eucalyptus, threaten this plant.


Flowers and immature fruit of *Arctostaphylos morroensis* from Montaña de Oro State Park.


Mature fruit of *Arctostaphylos morroensis* from Montaña de Oro State Park.


Stand of *Arctostaphylos morroensis* in maritime chaparral of Montaña de Oro State Park.

DISTRIBUTION *of* MORRO MANZANITA (*Arctostaphylos morroensis*)

Sources:
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OSO MANZANITA
Arctostaphylos osoensis

Sensitive Status
Federal: None.
State: G1/S1.2.
CNPS: 1B.2.

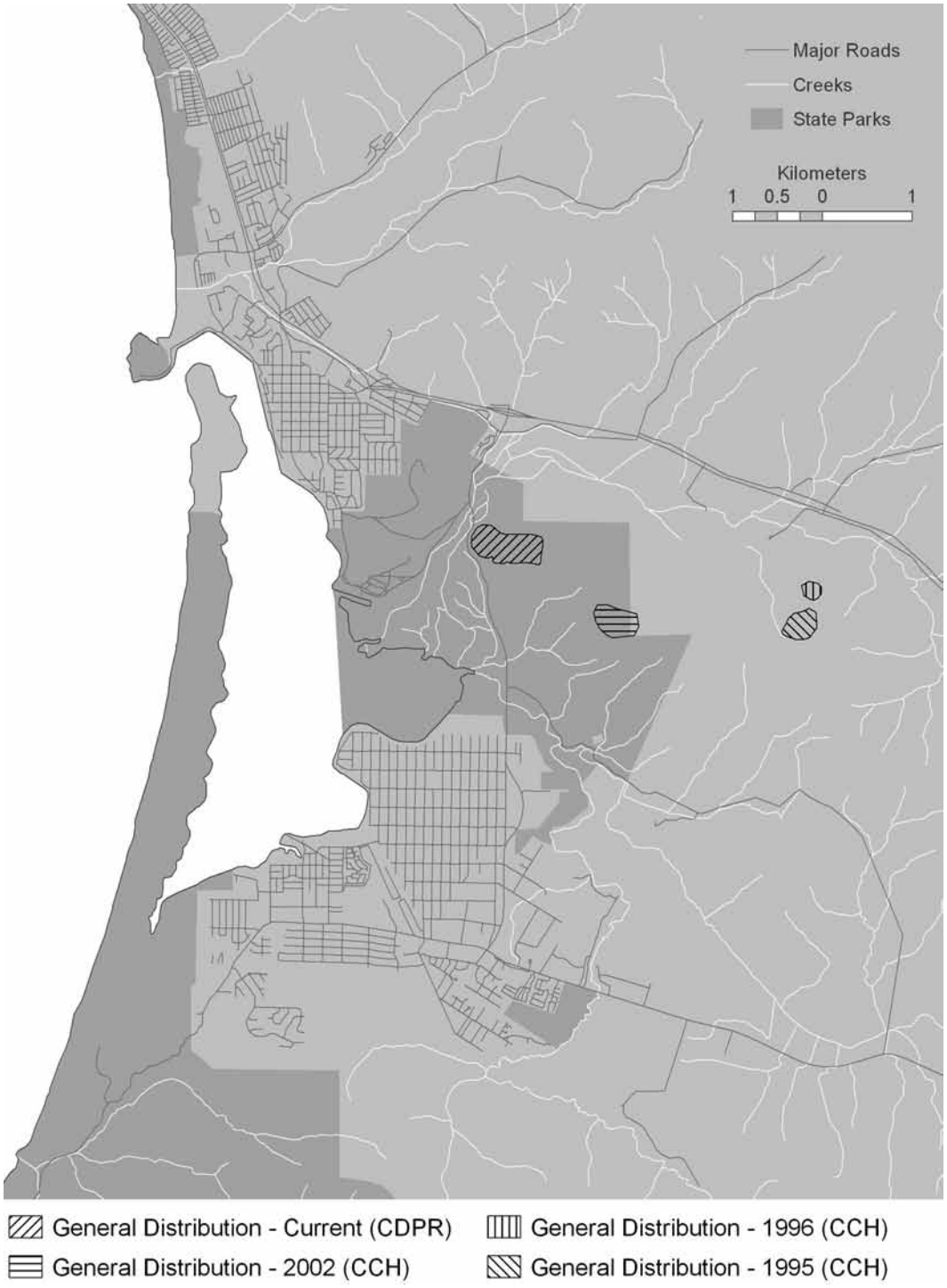
Life Form: Perennial shrub.
Blooming Period: February to March.
Habitat: Chaparral and oak woodlands.
Range: California endemic restricted to the hills between Morro Bay and Los Osos of San Luis Obispo County.
Identification: A spreading, 1 to 4 meter (3.3 to 13 feet) tall shrub with rough gray bark that is persistent as flat shreds. Twigs are short-tomentose and leaves are smooth and more or less shiny on both sides, with sparse short hairs or none at all. Leaves are strongly overlapping and clasp around the stem. Ovary and fruit are hairless.
Life History: This species has been incorrectly reported as *Arctostaphylos cruzensis* based on old taxonomy. However, it has since been correctly identified as a dominant species in the chaparral of Cerro Cabrillo. Native Americans and early settlers once used manzanitas for food, herbal remedies, and small wood products. Their fruits are edible and can be used to make drinks and jellies. Various small mammals and birds are drawn to manzanita berries to feed, and its dense foliage also provides them with shelter and protection. Manzanita is also a valuable asset for erosion control.
Status in Morro Bay area: Locally common. Occurs west of Los Osos Valley, from Cerro Cabrillo and Park Ridge of Morro Bay State Park to Hollister Peak. Locally common along western Cerro Cabrillo (CDPR staff), along with central portions of Park Ridge and north and southwest face of Hollister Peak (Calflora 2010, CCH 2008, CNDDB 2009). Also documented in 2005 on a ridge between Islay and Hazard Canyons of Montaña de Oro State Park, just outside the area of focus for this report (CCH 2008).
Threats: The only listed threat to this species is urbanization. Much of its preferred habitat has been altered or destroyed for development. Continued protection and maintenance of its current distribution may be necessary to preserve future populations.


Leaves and inflorescence of *Arctostaphylos osoensis*. Source: © 2007 Michael Walgren (Used With Permission).


Arctostaphylos osoensis (darker shaded shrub on left) in maritime chaparral of Cerro Cabrillo. Source: © 2007 Michael Walgren (Used With Permission).


Stand of *Arctostaphylos osoensis* in chaparral. Source: © 2007 Michael Walgren (Used With Permission).

DISTRIBUTION *of* OSO MANZANITA (*Arctostaphylos osoensis*)



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PECHO MANZANITA
Arctostaphylos pechoensis

Sensitive Status
Federal: None.
State: G2/S2.2.
CNPS: 1B.2.

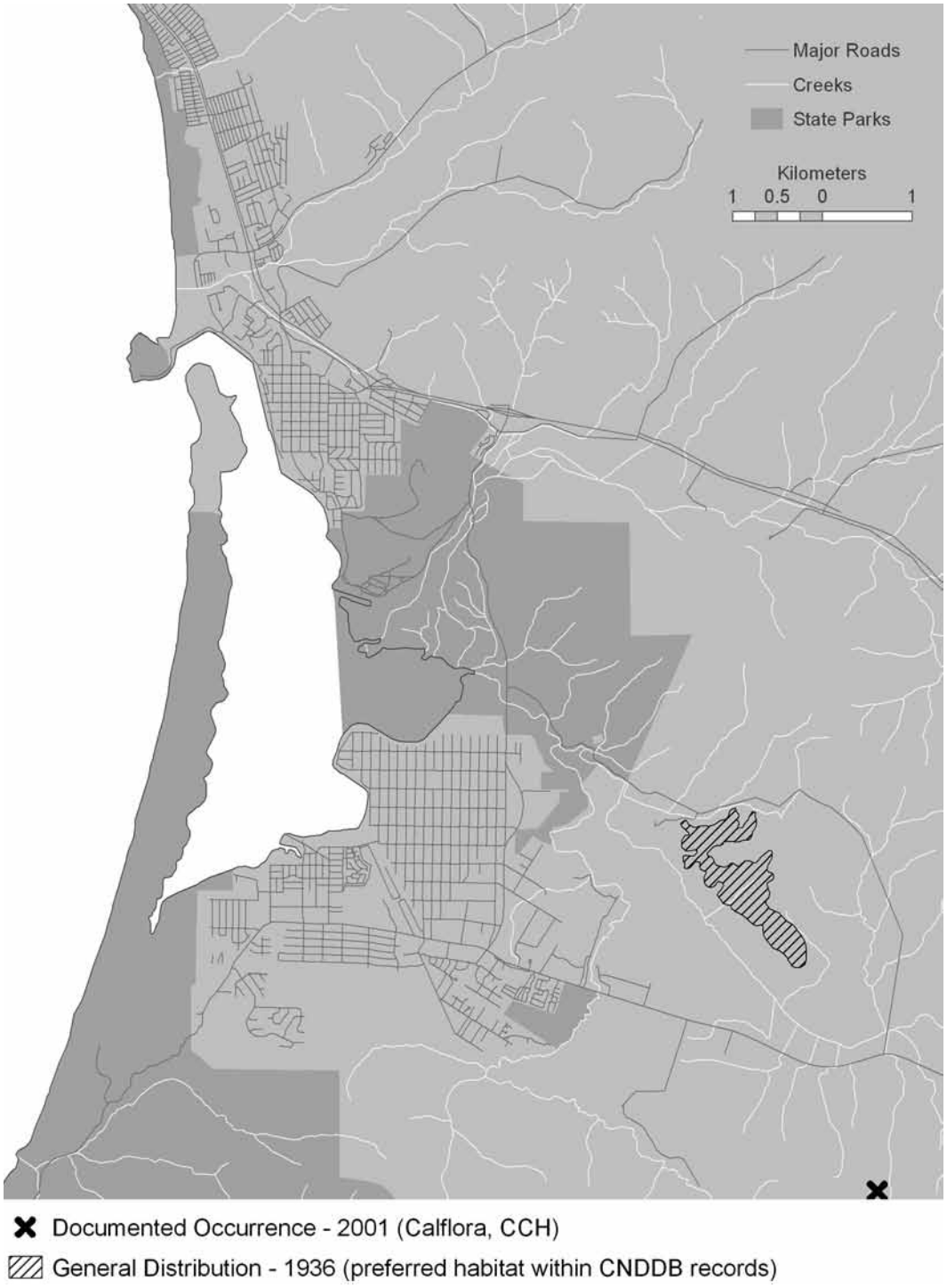
Life Form: Perennial shrub, tree-like.
Blooming Period: January to March.
Habitat: Shale outcrops, chaparral, and coastal coniferous forest.
Range: Endemic to the central coast of California, from Irish and Pecho Hills of San Luis Obispo County to northern Santa Barbara County.
Identification: A bushy shrub, 2 to 5 or more meters (6.6 to 16.4 feet) tall, with smooth dark red-brown bark and branches that are finely tomentose with long white bristles. Its dull to shiny heart shaped leaves strongly overlap, and are sessile or with very short petioles. Leaves are similar on both sides and are covered with small fine hairs that disappear with age. The flower ovary and fruit are smooth and without hairs. Does not form basal burl.
Life History: *Arctostaphylos pechoensis* used to be considered a variety of *A. andersonii* based on morphological similarities, and also had a variety named *A. pechoensis* var. *viridíssima* at one time. As if that weren't confusing enough, some historic records for the area were also miss-identified as *A. viridissima* (known only from eastern Santa Cruz Island, California). It is currently known only as *A. pechoensis*, with no recognized varieties or subspecies.
Status in Morro Bay area: Uncommon. The type locality of this species is "head of Wild Cherry Canyon". It occurs along western part of San Luis Range, from head of See Canyon, San Luis Obispo, to the coast near mouth of Coon Creek, Montaña de Oro State Park (Hoover 1970). There are only two records of *A pechoensis* within the study area; one from 1936, noted 3.2 km (2 miles) south-southwest of Hollister Peak (CNDDB 2009, McMinn 1959); and the other from 2001, noted along Clark Valley Road in the Irish Hills, 4.5 km (2.8 miles) south of Los Osos Valley Road (Calflora 2010, CCH 2010).
Threats: Due to its endemism and fairly restricted remaining populations, *A. pechoensis* is considered to be fairly threatened by the California Native Plant Society. Current threats are alteration and/or loss of habitat from urbanization.

Flowers of *Arctostaphylos pechoensis*. Source: © 2007 Michael Walgren (Used With Permission).

Ripening fruit of *Arctostaphylos pechoensis*. Source: © 2007 Michael Walgren (Used With Permission).

Shrubs of *Arctostaphylos pechoensis* in chaparral habitat. Source: © 2007 Michael Walgren (Used With Permission).

DISTRIBUTION *of* PECHO MANZANITA (*Arctostaphylos pechoensis*)



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DACITE MANZANITA
Arctostaphylos tomentosa daciticola

Sensitive Status
Federal: None.
State: G4T1/S1.1.
CNPS: 1B.1.

Life Form: Woody shrub.
Blooming Period: March to May.
Habitat: Occurs along slopes of maritime chaparral, chaparra1, and foothill woodland. Typically on rocky or sandy loam soils that are well drained and contain mineral dacite.
Range: Endemic to sandstone hills consisting of dacite of northeast Los Osos Valley in San Luis Obispo County, California.
Identification: An often wide, more or less flat-topped shrub of 1 to 2.5 meters (3.3 to 8.2 feet) tall. Its gray, rough bark is persistent as flat shreds. Twigs have short hairs and long white bristles. Lower surface of leaf is tomentose (densely haired/woolly) yet smooth, while the upper surface is dark to light green and shiny. The flower pedicel and ovary are densely white-tomentose. Forms basal burl and will re-sprout after fire.
Life History: Dacite manzanita is endemic to soils that contain mineral dacite. Dacite is an igneous volcanic rock that may be considered a quartz bearing variety of andesite, and contains quartz as rounded, corroded crystals or grains, or as a constitute of the groundmass. It primarily forms lava flows, dikes, and sometimes massive intrusions in the centers of old volcanoes, such as those of the Nine Morros (Nine Sisters) of San Luis Obispo County. As with most manzanitas, the fruit of Dacite manzanita may be edible, and the name manzanita is Spanish for "little apple", which is indicative of the general appearance and taste of their berries.
Status in Morro Bay area: Uncommon. Only known occurrences within the area are from Hollister Peak and an abandoned dacite mine near Morro Bay State Park. Noted along "flood ranch at end of Canet Road on west flank of Hollister Peak" in 1989 (CCH 2008), and along "lower north slope of Hollister Peak" in 1992 (CNDDB 2009). Current documentation within the dacite mining area exists, however specific populations have not been mapped.
Threats: This highly endemic species is potentially threatened by urbanization. Future protection and maintenance of its preferred habitat and range are likely necessary to keep local populations thriving.


Young branch and leaves of *Arctostaphylos tomentosa daciticola*. Source: © 2007 Michael Walgren (Used With Permission).


Lower (left) and upper (right) sides of leaves of *Arctostaphylos tomentosa daciticola*. Source: © 2007 Michael Walgren (Used With Permission).


Shrub of *Arctostaphylos tomentosa daciticola*. Source: © 2007 Michael Walgren (Used With Permission).

DISTRIBUTION *of* DACITE MANZANITA (*Arctostaphylos tomentosa daciticola*)

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INDIAN KNOB MOUNTAINBALM
Eriodictyon altissimum

Sensitive Status
Federal: Endangered, December 15, 1994.
State: G2Q/S2.2; Endangered, July 1979.
CNPS: 1B.1.


Flower of *Eriodictyon altissimum*. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.


Eriodictyon altissimum. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.

Life Form: Perennial, evergreen shrub.
Blooming Period: March to June.
Habitat: Marine sandstone containing tar deposits, Baywood fine sand, and weathered ancient dune soils. Occurring in chaparral, maritime chaparral, and oak woodland.
Range: Endemic to southwestern San Luis Obispo County, California. Known from Hazard Canyon within Montaña de Oro State Park, Morro Dunes Ecological Preserve, and locally from Indian Knob, which is the type locality of this species.
Identification: *Eriodictyon altissimum* is a 2 to 4 meter (6.6 to 13 feet) tall, relatively weak, straggly shrub. Its linear leaves are 5 to 9 cm (2 3.5 in) long by 2 to 4 mm (0.08 to 0.16 in) wide, and have a somewhat sticky upper surface. Leaf margins are strongly rolled under, with an undersurface that is densely white hairy. Its small lavender flowers are sparsely hairy and grow uncongested at the tips of branches. New growth is primarily from rhizomes, but flowers also produce numerous tiny black or dark brown seeds.
Life History: This species has recently been reclassified as a member of the Boraginaceae family, but is still currently recognized within the Hydrophyllaceae family in authoritative references. It exhibits all of the characteristics of a seral species and likely requires fire for persistence. It is relatively short-lived and can reproduce vigorously by seed or rhizome, and is most commonly observed in open areas within, or along the edge of closed canopy chaparral communities.
Status in Morro Bay area: Very uncommon. There are currently only five highly localized populations in the area, each with only a few individuals left. Two of the populations are from Hazard Canyon within Montaña de Oro State Park, another two are at Morro Dunes Ecological Preserve, and the last is at the end of Highland Drive (CDPR staff, CNDDB 2009, USFWS 2009). At one time about 30 individuals occurred in a parcel owned by Los Osos Community Services District, referred to as the Broderson Parcel. However, 1985 surveys returned no results, and its present status within the parcel is unknown (USFWS 2009).
Threats: Currently known from less than 600 individuals. Thought to be adapted to ecological disturbances, including fire, which is now suppressed. Other threats include urbanization, energy development, off-road vehicle use, and non-native plants. The California Department of Parks and Recreation (CDPR) is currently proposing to conduct prescribed burns within Montaña de Oro State Park, which will help provide future habitat for *E. altissimum*. In addition, CDPR is planning to implement restricted access, development and implementation of management and monitoring plans, control of exotic plant species, and education programs.

DISTRIBUTION *of* INDIAN KNOB MOUNTAINBALM (*Eriodictyon altissimum*)

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BREWER'S SPINEFLOWER
Chorizanthe breweri

Sensitive Status

Federal: USDA Forest Service Sensitive Species.
State: G2/S2.2.
CNPS: 1B.3; Bureau of Land Management Sensitive Species.

Life Form: Annual herb.
Blooming Period: April to August.
Habitat: Chaparral and coastal scrub typically in serpentine with rocky or gravelly soil. Also in closed-cone coniferous forest and cismontane woodland.
Range: Endemic to the Central Coast of California in San Luis Obispo and southern Monterey Counties. Locally common to the southern portion of the Santa Lucia Range from Morro Creek to east fork of Corral de Piedra Creek in San Luis Obispo County.
Identification: This species is closely related to *Chorizanthe staticoides*. It is a small, low growing herb with thinly haired, reddish stems and tiny, 3 to 3.5 mm (0.12 to 0.14 in), white to red, hairy flowers. The stems grow from 3 to 35 cm (1.2 to 13.8 in) in length and mostly lie flat on the ground with tips curving upward. Its egg-shaped leaves arise from the base of the plant and are thinly haired to tomentose below.
Life History: Past and present uses for this plant, medicinal or otherwise, are unknown. The name *Chorizanthe* is derived from Greek roots that correspond to the terms "divided flower" (chori = asunder, or divided; anthe = a flower). In this sense, the name implicates that the parianth (petals and sepals) are divided.
Status in Morro Bay area: Uncommon. There is only one record of *Chorizanthe breweri* in the Morro Bay area, noted as occurring within the northern and southern Morro Bay quad (CNDDB 2009). Although no specific location information is available, this species is often overlooked due to its very small size, and has the potential to occur in local populations within preferred habitat throughout the area.
Threats: The California Native Plant Society lists this species as threatened by pipeline construction, and potentially threatened by road construction and maintenance, as well as off-road vehicle use.

Inflorescence stalk of *Chorizanthe breweri* along West Cuesta Ridge of San Luis Obispo County, California.

Chorizanthe breweri. Source: Gerald and Buff Corsi © 2007 California Academy of Sciences (Used With Permission).

DISTRIBUTION *of* BREWER'S SPINEFLOWER (*Chorizanthe breweri*)

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Bureau of Land Management (BLM). 2004. List of California-BLM sensitive plants, Updated April 2004. 20 March 2009 <www.blm.gov/ca/pdfs/pa_pdfs/biology_pdfs/SensitivePlants.pdf>.
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OBISPO INDIAN PAINTBRUSH
Castilleja densiflora obispoensis

Sensitive Status
Federal: None.
State: G5T2/S2.2.
CNPS: 1B.2; Bureau of Land Management Sensitive Species.

Life Form: Annual herb.
Blooming Period: Late March to May.
Habitat: Occurs in meadows, seeps, and coastal grassland, sometimes in serpentine and/or sandy soils.
Range: Endemic to coastal grassland of San Luis Obispo County, California.
Identification: This subspecies of *Castilleja densiflora* has white to pale yellow flowers with white tipped bracts. It is the same size as the general species, at 10 to 40 cm (4 to 15.7 in) tall. The leaves are linear to lanceolate and have 0 to 3 lobes. It can be told apart from similar species by its flower, which has a straight corolla beak that is finely haired, filaments that are hairless, and a stigma that is more or less exserted.
Life History: Another common name to this species is San Luis Obispo owl's clover. This species, along with all others in the *Castilleja* genus, is a partial parasite on the roots of grasses and forbs. Native Americans consumed the flowers of *Castilleja* species in moderation as a condiment. However, they have a tendency to absorb and concentrate Selenium in their tissues from the soils in which they grow, and can potentially be very toxic if plant parts other than flowers are consumed (these plants should not be consumed for this reason, not to mention the fact that they are also considered rare). Various Native American tribes have also used *Castilleja* species in the past as their name suggests, as a paintbrush, and they also have some medicinal properties.


Inflorescence of *Castilleja densiflora obispoensis*. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.


Patch of *Castilleja densiflora obispoensis*. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.

Status in Morro Bay area: Uncommon. The only recent documentation of this species in the area is from the top of Turri Road (Walgren pers. comm.). Historical documentation notes occurrences around Morro Bay, however specific location information is not given. Records include individuals from: 1940 and prior on grassy slopes in view of the ocean 1.6 km (1 mile) north of Morro Bay, along Main Street and Highway 1; from 1969 at San Bernardo Creek, east of Morro Bay; and from 1978 at "south end of Morro Bay" (Calflora 2010, CCH 2008, CNDDB 2009, Robert F. Hoover Herbarium 2010).
Threats: The natural range of this species has been greatly reduced due to coastal development. It is potentially threatened by further urban expansion and other forms of habitat loss and/or modification. Grazing has also been contributed to its historic and current decline.

DISTRIBUTION *of* OBISPO INDIAN PAINTBRUSH (*Castilleja densiflora obispoensis*)

Sources:

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SALT MARSH BIRD'S-BEAK
Cordylanthus maritimus maritimus

Sensitive Status
Federal: Endangered, September 28, 1978.
State: G4?T2/S2.1; Endangered, July 1979.
CNPS: 1B.2.


Inflorescence of *Cordylanthus maritimus maritimus*. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.


Population of *Cordylanthus maritimus maritimus*. Source: © 2006 *Native Flora of Estero Bay*, Walgren et al.

Life Form: Annual herb.
Blooming Period: May to October.
Habitat: Coastal dunes and strand in coastal salt marsh and wetland-riparian habitats.
Range: Disjunct coastal salt marshes from San Luis Obispo County to northern Baja California, Mexico. Historically in inland salt marshes of Los Angeles, San Bernardino, and San Diego Counties as well as more coastal salt marshes than it currently occupies.
Identification: This species is similar to Indian paintbrush (*Castilleja* spp.), except the tip of the flower beak is closed. It is gray-green in color and grows from 10 to 40 cm (4 to 15.7 in) in height. Leaves and bracts are generally hairy and often coated with salt. Its white to cream colored flowers are 15 to 25 mm (0.6 to 1 in), with minute hairs. Lips of flowers are pale white to brownish or purplish red in color. Fruit is a capsule containing 10 to 40 deeply netted, dark brown seeds.
Life History: This plant is a green hemiparasitic (deriving some of its physiological needs from another plant) halophyte (tolerating or thriving in alkaline soils). Its geographical and ecological distribution is inherently limited by the distribution of its host plants, which are salt grass (*Distichlis spicata*), alkali heath (*Frankenia salina*), bull tule (*Scirpus robustus*), broad-leaved cattail (*Typha latifolia*), and possibly others. Since its listing in 1979, *C. m. maritimus* has undergone changes in taxonomic classification and nomenclature. It was previously named *Chloropyron maritimum maritimum* and is now considered to be a member of the Orobanchaceae family. Its change of family is not currently recognized in the literature and is thus still referenced under the Scrophulariaceae family for this reference.
Status in Morro Bay area: An uncommon species that historically occurred throughout the shores of Morro Bay (Hoover 1970). Presently restricted to only a few small patches in coastal salt marsh of Sweet Springs Nature Preserve, southern Cuesta-by-the-Sea, as well as sandspit and Shark's Inlet of Montaña de Oro State Park (Calflora 2010, CCH 2008, CDPR staff, CNDDB 2009). In 2005 surveys of State Park lands, only four populations were discovered (CDPR staff).
Threats: Habitat loss and alteration due to development is the main threat to this species. It is also threatened by off-highway vehicles, particularly in San Diego, Orange, and Ventura Counties. Human induced changes in hydrology are a threat, and have possibly extirpated several local populations throughout the past. It is threatened in the Morro Bay area by foot traffic, vehicle use, marsh fill, coastal development, exotic plants, and recreation.

DISTRIBUTION *of* SALT MARSH BIRD'S-BEAK (*Cordylanthus maritimus maritimus*)

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POPCORN LICHEN
Cladonia firma

Sensitive Status
Federal: None.
State: G4/S1.1.
CNPS: Recommended List 2 or 1B by California Lichen Society.


Clump of *Cladonia firma*. Source: © 2006 *Common Lichens of the Estero Bay Area*, Lisa Andreano.


Biological crust of *Cladonia firma*, mosses, and other lichens. Source: © 2006 *Common Lichens of the Estero Bay Area*, Lisa Andreano.

Growth Form: Fruticose and squamulose.
Habitat: Forms crust on undisturbed soil and detritus of stabilized dunes in dune scrub and maritime chaparral. In Los Osos, it tends to favor level or slightly inclined areas of Baywood fine sands with a thick layer of detritus, rabbit dung, and mosses. Develops in the open and also under native plants.
Range: Locally abundant in scatted maritime habitats of Europe. In North America it is known only from a few populations in California from southern Morro Bay to just south of Hazard Canyon in San Luis Obispo County.
Identification: *Cladonia firma* is a shrubby gray lichen consisting of hollow, cup-shaped podetia (secondary upright thalli) that are squamulose (small, scale-like lobes lifting from the surface that are strongly ascending and almost foliose). Its squamules are the largest of any member of the genus in California, up to 25 mm (1 in) long and 10 mm (0.4 in) wide, and form small clumps from 2 to 25 cm (0.8 to 9.8 in) in diameter. This species is conspicuous when dry because its large, densely packed squamules roll inward to expose white or brown undersides.
Life History: This lichen, as with many others, is a soil stabilizer that often forms biological crusts with other lichens and moss. It has a growth form that is well adapted to mild disturbance, having the ability to regenerate even if turned completely upside down. When dry, its large primary squamules, which resemble leaves, curl up and expose white undersides that may resemble popcorn, giving this species its common name. The genus name *Cladonia* is from the Greek root clado, meaning a branch, which describes the growth form of this group of lichens. *Cladonia firma* is also known as firm cup lichen, and has been previously described as *Cladonia foliacea* var. *firma* and *Cladonia nylanderi* in literature.
Status in Morro Bay area: Locally common throughout southeastern Morro Bay State Park, near Los Osos Middle School (Powell State Properties); maritime chaparral of Los Osos Oaks Reserve; and from northern Montaña de Oro State Park to just south of Hazard Canyon, with a large population on a ridge of stabilized dune above the sandspit parking lot. In addition to State Park lands, two other small populations exist in Los Osos; one on a vacant lot in the southeast corner of South Bay Blvd. and Nipomo Street, and the other on Cordoniz property (under control of the Bureau of Land Management), east of Bayview Heights and Calle Cordoniz (Knudsen and Lendemer 2007, UCR 2010, CDPR staff).
Threats: When first collected, *Cladonia firma* was described as being locally abundant in the Los Osos area. Since its discovery, local populations have been severely reduced and/or extirpated in the area from urban development. Existing populations are in decline and ultimately in danger of extirpation, especially from veldt grass (*Ehrharta calycina*). Other major threats include recreational use (hiking, horseback riding, off-road vehicles, etc.) and domestic animals. The California Lichen Society recommends protection of Los Osos populations through posting and possible fencing of remaining habitat.

DISTRIBUTION *of* POPCORN LICHEN (*Cladonia firma*)

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BLACK AND WHITE TUBE LICHEN
Hypogymnia mollis

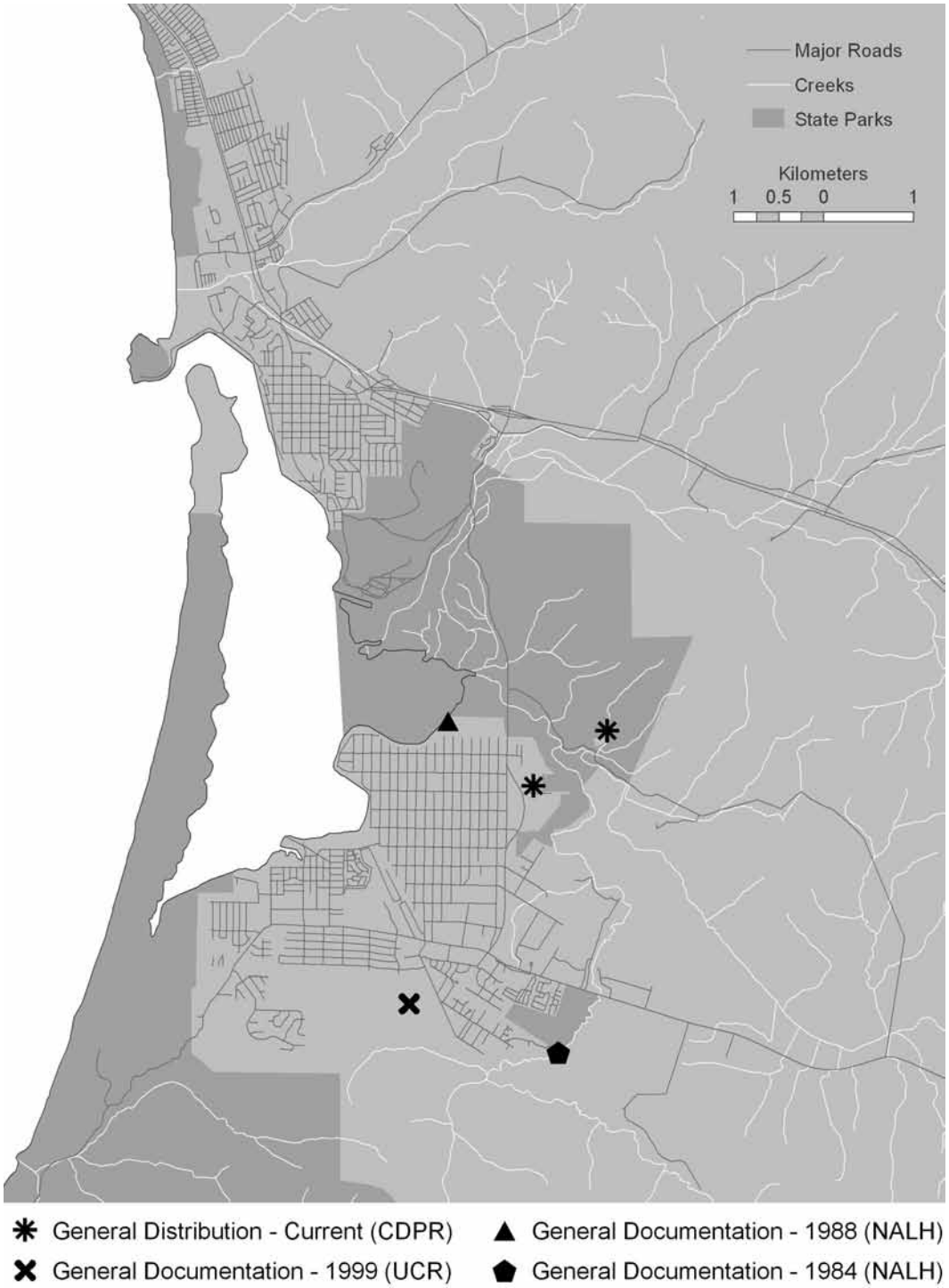
Sensitive Status
Federal: None.
State: None.
CNPS: None. Noted as a very rare, highly endemic lichen, and should be considered for CNPS 1B listing.


Close up of *Hypogymnia mollis*, showing its rather thick, whitish gray thallus. Source: © 2006 *Common Lichens of the Estero Bay Area*, Lisa Andreano.


Hypogymnia mollis on branch of native shrub. Source: © 2006 *Common Lichens of the Estero Bay Area*, Lisa Andreano.

Growth Form: Foliose.
Habitat: Grows on the bark and twigs of shrubs and trees in coastal scrub, coast live oak woodland, and maritime chaparral. Common host species include: buckbrush (*Ceanothus cuneatus*), Morro manzanita (*Arctostaphylos morroensis*), coastal sagebrush (*Artemisia californica*), and coast live oak (*Quercus agrifolia*).
Range: Endemic to coastal southwestern North America, from Morro Bay of San Luis Obispo County, California, south to Baja California, Mexico.
Identification: *Hypogymnia mollis* is a rather adnate, pale greenish gray foliose (shrubby) lichen, which lacks apothecia and has surface soralia. It has a thick thallus that is whitish to whitish gray on the upper surface and dark below, with lobes that are sometimes tube-like. The thallus of *H. mollis* is shorter and stouter than other *Hypogymnia* species.
Life History: The genus name *Hypogymnia* is Greek for bare beneath (hypo = under, beneath; gymn = naked, bare), likely referring to its thalli, which have smooth undersurfaces that lack rhizines (a hyphal extension that generally serves to attach a foliose thallus to its surface). The specific epithet, *mollis*, is Latin for soft, which may refer to its general appearance and rather smooth thalli.
Status in Morro Bay area: Uncommon. Known only from a few occurrences in preferred habitat within Morro Bay State Park and Los Osos Oaks Reserve. A herbarium specimen from 1988 indicates that it may also occur in the Elfin Forest Natural Preserve (managed by Small Wilderness Area Preservation); listed as occurring just north of town of Baywood Park, north of Los Osos at an elevation of 25 meters (82 feet) (NALH 2010, UCR 2010, CDPR staff).
Threats: Potentially threatened by habitat loss from development throughout its range. Currently known only from protected State Park lands within the Morro Bay area, which are maintained and managed by the California Department of Parks and Recreation.

DISTRIBUTION *of* BLACK AND WHITE TUBE LICHEN (*Hypogymnia mollis*)



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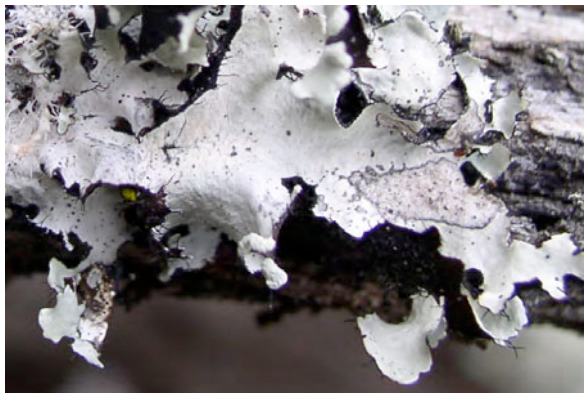
POWDERED RUFFLE LICHEN
Parmotrema hypoleucinum

Sensitive Status
Federal: None.
State: None.
CNPS: None. Uncommon endemic, should be considered for CNPS listing.

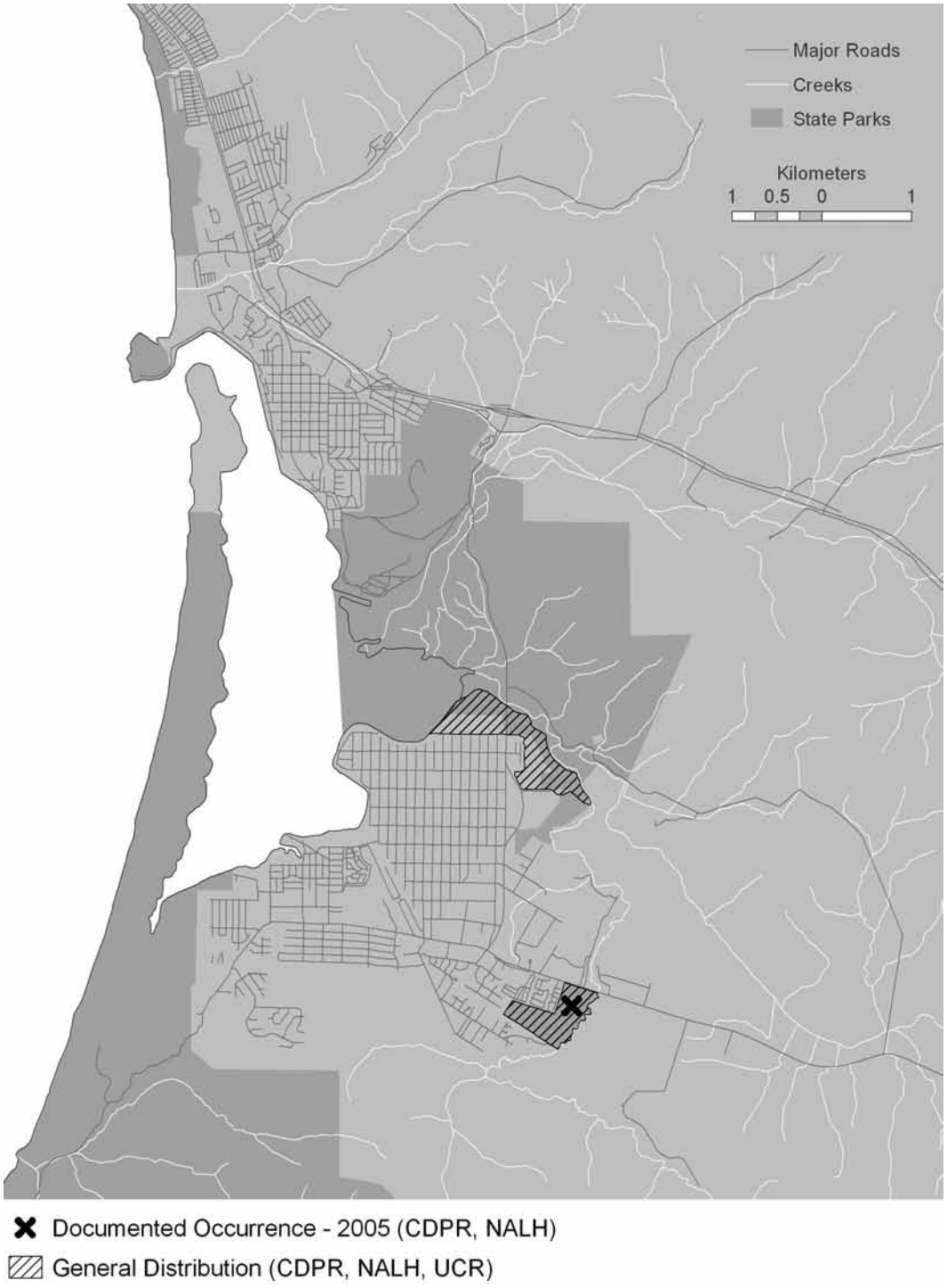


Parmotrema chinense (similar in appearance to *P. hypoleucinum*). Source: Source: © 2006 *Common Lichens of the Estero Bay Area*, Lisa Andreano.

Parmotrema chinense (similar in appearance to *P. hypoleucinum*). Source: Source: © 2006 *Common Lichens of the Estero Bay Area*, Lisa Andreano.

Growth Form: Foliose.
Habitat: Grows on bark of various shrubs and trees, and occasionally on shaded rock. Occurs in maritime chaparral, chaparral, oak woodland, coniferous forest, and variety of other habitats.
Range: Known from eastern and western coasts of United States, central United States from southern Missouri south to eastern Texas and Louisiana, as well as scattered locations in Spain. Occurs in coastal California from San Mateo County south to Baja California, Mexico.
Identification: In general, *Parmotrema hypoleucinum* is a pale to yellowish gray, foliose lichen. Its thalli lobes are 3 to 15 mm (0.1 to 0.6 in) wide and very ruffled. It is very similar to common *Parmotrema chinense*, and can be differentiated by comparing the underside margin; which is light colored in *P. hypoleucinum* and solid dark in *P. chinense*. *Parmotrema hypoleucinum* is also virtually identical to *P. hypotropum*, but the latter does not occur in California.
Life History: The genus name *Parmotrema* is Greek and Latin for small shield and hole (parm (L)= a small shield; trema (G)= a hole). This likely refers to the apothecia of this group, which are prominent, very large disks that sometimes have an irregular hole through their center. The specific epithet *hypoleucinum* is Greek for white underneath (hypo = under, beneath; leuc = white), which likely refers to the thalli margins of this species. *Parmotrema hypoleucinum* was previously described as *Parmelia hypoleucina*.
Status in Morro Bay area: Occurs seldom on bark of trees and shrubs within Elfin Forest Natural Preserve, Morro Bay State Park near Los Osos Middle School (Powell State Properties), Los Osos Oaks Reserve, and Montaña de Oro State Park. (UCR 2010, NALH 2010, CDPR staff).
Threats: Coastal development was likely the largest historical threat to this species, and it may be threatened by air pollution in highly populated areas. Current threats within the Morro Bay area are unknown.

DISTRIBUTION *of* POWDERED RUFFLE LICHEN (*Parmotrema hypoleucinum*)



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SPLITTING YARN LICHEN
Sulcaria isidiifera

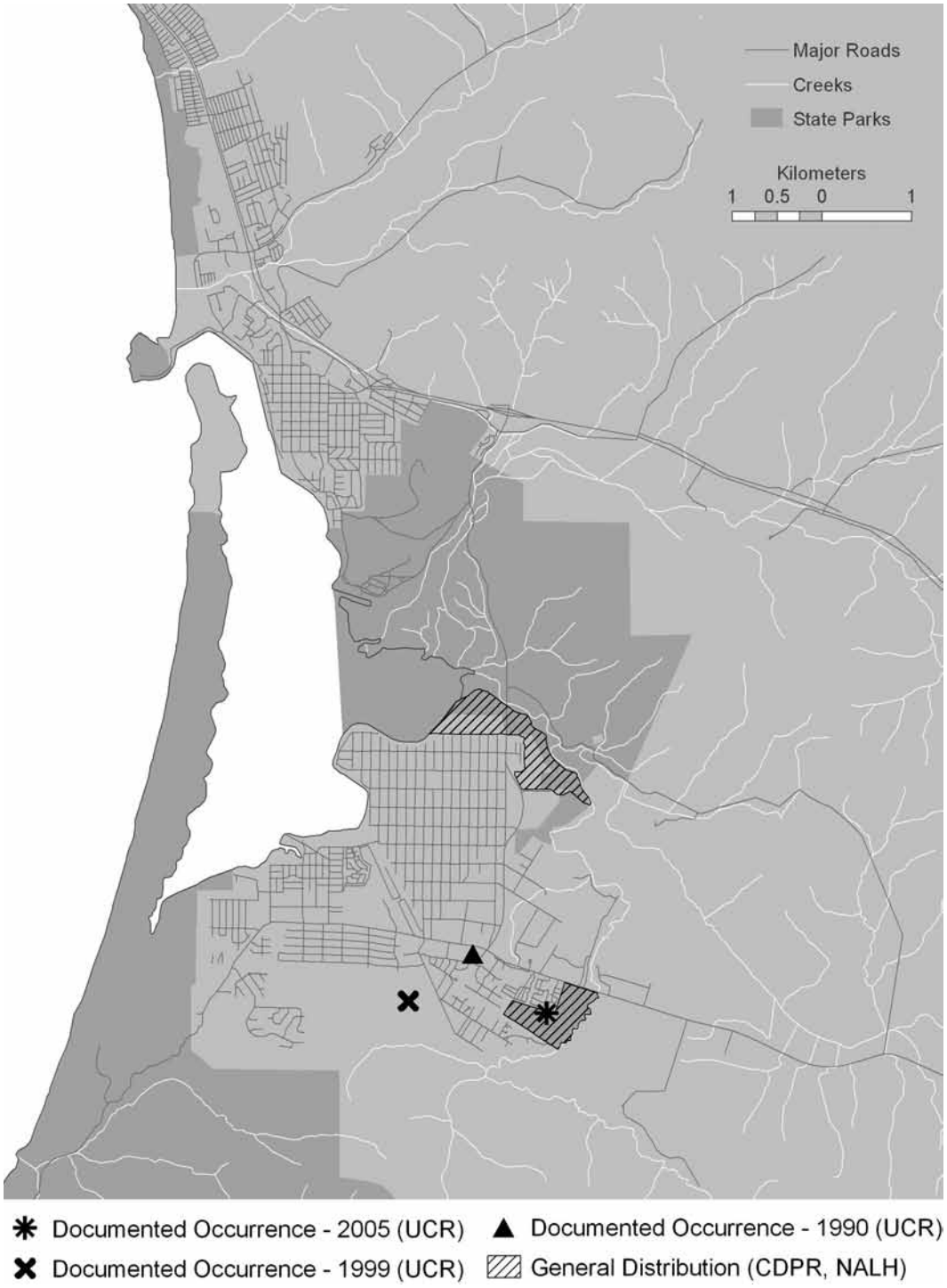
Sensitive Status
Federal: None.
State: G1/S1.1.
CNPS: Recommended list 1B by California Lichen Society.

Growth Form: Fruticose and filamentous.
Habitat: Occurs in old-growth coastal scrub, maritime chaparral, and oak woodland habitats. Non-species specific, growing on chamise (*Adenostoma fasciculatum*), buckbrush (*Ceanothus cuneatus*), coast live oak (*Quercus agrifolia*), and others.
Range: Known only from Los Osos, San Luis Obispo County, California.
Identification: A dull yellowish-white to gray shrubby lichen, with branching thalli that reach 3 to 5 cm (1.2 to 2 in) in length. Main thalli branches are 0.3 to 0.5 mm (0.01 to 0.02 in) wide and very brittle. Its thallus has a longitudinal groove or split down the center that is filled with isidia (small branched or un-branched growths that may function as propagules). Similar to many other filamentous fruticose lichens, such as *Alectoria sarmentosa* and some species in the genera *Usnea* and *Bryoria*; however no other lichen has longitudinal soralia that split open to reveal isidia.
Life History: *Sulcaria isidiifera* is dispersed by gravity, wind, and animals. The genus name *Sulcaria* is Latin for a furrow, groove, or trench, which refers to the distinctive groove on its thallus. The specific epithet *isidiifera* literally translates to a starry wild beast in Latin, which may refer to the overall appearance of its branching thalli.
Status in Morro Bay area: Believed to be endemic to the Los Osos area; known only from sporadic locations in Morro Bay and Montaña de Oro State Parks, Los Osos Oaks Reserve, as well as private properties throughout Los Osos and Baywood Park (Carlberg and Knudsen 2007, UCR 2010, NALH 2010, CDPR staff).
Threats: Populations were greatly reduced in the past from coastal development. It is currently vulnerable to further development and the short fire history cycle of its type habitat. Many of its occurrences are within boundaries of State Park lands and continued conservation, management, and maintenance is recommended for future populations to thrive.

Sulcaria isidiifera on inner branches of *Adenostoma fasciculatum*. Source: © 2006 *Common Lichens of the Estero Bay Area*, Lisa Andreano.

Close up of branched thalli on *Sulcaria isidiifera*. Source: © 2006 *Common Lichens of the Estero Bay Area*, Lisa Andreano.

DISTRIBUTION *of* SPLITTING YARN LICHEN (*Sulcaria isidiifera*)



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ARMORED FOG LICHEN
Niebla tuberculata

Sensitive Status
Federal: None.
State: None.
CNPS: None. Rare and highly endemic, should be considered for CNPS listing.

Growth Form: Fruticose.
Habitat: Grows on rocks along the immediate coast, and on near shore rocks of coastal islands.
Range: Endemic to the central and southern coast of California.
Identification: In general, *Niebla* species are pale yellow-green fruticose lichens that form clumps of stiff, rounded to flattened branches. Their cortex is usually tough and thick, composed of cells that are perpendicular to the surface. *Niebla tuberculata* is unique in the family in having a central, easily crumbled cordlike mass (as opposed to the elastic central cord of *Usnea* species).
Life History: *Niebla* species are specialized fog zone taxa, only growing on coastal rocks and rocks on nearshore islands. They are extremely variable in appearance, and have a very complex chemistry. The group is in much need of further research into its distribution, ecological, chemical, and anatomic understanding. A similar species, *N. ceruchoides*, has been described as a seed trap and nursery for a number of *Dudleya* taxa, and researchers are currently designing experiments to understand nutrient cycling in rocky coastal habitats dominated by *Niebla* species. The specific epithet, *tuberculata*, is Latin for little knob or swelling, which likely refers to the appearance of its thalli. *Niebla tuberculata* was previously described as *Vermilacinia tuberculata*.
Status in Morro Bay area: Rare. Known only from Morro Rock State Reserve and shale rock outcrops above an established channel in the estuary, near Bay Shore Drive of Morro Bay State Park (UCR 2010, NALH 2010, CDPR staff).
Threats: Threatened by habitat reduction and fragmentation due to coastal development. In the Morro Bay area it is known only within protected lands managed by the California Department of Parks and Recreation. Continual protection and maintenance of State Park lands is likely necessary for future generations to succeed. Potentially threatened by global climate change and sea level rise due to its immediate coastal existence.

Niebla tuberculata. Source: © 2006 *Common Lichens of the Estero Bay Area*, Lisa Andreano.

Close up of thallus on *Niebla tuberculata*. Source: © 2006 *Common Lichens of the Estero Bay Area*, Lisa Andreano.

Close up of variable thalli on *Niebla tuberculata*. Source: © 2006 *Common Lichens of the Estero Bay Area*, Lisa Andreano.

DISTRIBUTION *of* ARMORED FOG LICHEN (*Niebla tuberculata*)

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APPENDIX A
Sensitive Status of Animals in the Morro Bay Area

Animal Sensitive Status Code Abbreviations

FEDERAL
ESA:FE = Endangered Species Act - Federally listed as Endangered
ESA:FT = Endangered Species Act - Federally listed as Threatened
FS:S = USDA Forest Service - Sensitive Species
FWS:BCC = U.S. Fish & Wildlife Service - Birds of Conservation Concern
FWS:SC = U.S. Fish & Wildlife Service - Species of Concern
MBTA = Listed in the Migratory Bird Treaty Act
MMC:SSC = Marine Mammal Commission - Species of Special Concern
MMPA = Listed in the Marine Mammal Protection Act
PIF:WL = U.S. Fish & Wildlife Service - Partners in Flight WatchList

STATE
CDF:G/S = California Department of Fish & Game - California Heritage (CNDDB) Element Rank
(Please see 'California Heritage [CNDDB] Element Ranking for Animals' on page 19)
CDF:S = California Department of Forestry & Fire Protection - Sensitive Species
CESA:SE = California Endangered Species Act - State listed as Endangered
CESA:ST = California Endangered Species Act - State listed as Threatened
DFG:ESSI = California Department of Fish & Game - Endemic Special Status Invertebrate
DFG:ESSV = California Department of Fish & Game - Endemic Special Status Vertebrate
DFG:FP = California Department of Fish & Game - Fully Protected
DFG:SSC = California Department of Fish & Game - Species of Special Concern
DFG:TW = California Department of Fish & Game - Taxa to Watch

Other Status
ABC:DY = American Bird Conservancy - Declining Yellow List Species
ABC:R American Bird Conservancy - Red List Species
ABC:RY = American Bird Conservancy - Rare Yellow List Species
AFS:E = American Fisheries Society - Endangered
BLM:S = Bureau of Land Management - Sensitive Species
CITES:I = Convention on International Trade in
Endangered Species of Wild Fauna and Flora - Appendix I
CITES:II = Convention on International Trade in
Endangered Species of Wild Fauna and Flora - Appendix I
EME:PL = Essig Museum of Entomology - Proposed for listing under Endangered Species Act
IUCN:CE = International Union for Conservation of Nature - Critically Endangered
IUCN:EN = International Union for Conservation of Nature - Endangered
IUCN:LC = International Union for Conservation of Nature - Least Concern
IUCN:NT = International Union for Conservation of Nature - Near Threatened
IUCN:VU = International Union for Conservation of Nature - Vulnerable
NAS:R = National Audubon Society - WatchList Red
NAS:Y = National Audubon Society - WatchList Yellow
WBWG:HP = Western Bat Working Group - High Priority
WBWG:LMP = Western Bat Working Group - Low to Medium Priority
WBWG:MP = Western Bat Working Group - Medium Priority

Species	FEDERAL	STATE	Other Status
Invertebrates			
GASTROPODA (snails, slugs, and abalone)			
Morro Shoulderband Snail (*Helminthoglypta walkeriana*)	ESA:FE	DFG:ESSI, G1/S1	IUCN:CE
INSECTA, Order Coleoptera (beetles)			
Sandy Beach Tiger Beetle (*Cicindela hirticollis gravida*)	None	DFG:ESSI, G5T2/S1	EME:PL
Globose Dune Beetle (*Coelus globosus*)	FWS:SC	DFG:ESSI, G1/S1	IUCN:VU
Morro 10-lined June Beetle (*Polyphylla* species novae *'morroensis'*)	None	None	New discovery
INSECTA, Order Lepidoptera (butterflies and moths)			
'Morro' Boisduval's Blue (*Plebejus icarioides 'moroensis'*)	FWS:SC (delisted)	DFG:ESSI, G5T1T3/S1S3	EME:PL
Fishes			
SALMONIDAE (trout and salmon)			
Coastal Rainbow Trout (*Oncorhynchus mykiss irideus*)	ESA:FT	DFG:SSC, G5T2Q/S2	AFS:E
GOBIIDAE (gobies)			
Tidewater Goby (*Eucyclogobius newberryi*)	ESA:FE	DFG:SSC, ESSV, G3/ S2S3	AFS:E IUCN:VU
Amphibians			
RANIDAE (true frogs)			
California Red-legged Frog (*Rana aurora draytonii*)	ESA:FT	DFG:SSC, G4T2T3/S2S3	IUCN:VU
Reptiles			
EMYDIDAE (box and water turtles)			
Southwestern Pond Turtle (*Actinemys marmorata pallida*)	FS:S	DFG:SSC, G3G4T2T3Q/ S2	BLM:S IUCN:VU
PHRYNOSOMATIDAE (spiny lizards)			
California Horned Lizard (*Phrynosoma coronatum frontale*)	None	DFG:SSC, G4G5/S3S4	BLM:S IUCN:LC CITES:II
ANNIELLIDAE (legless lizards)			
Silvery Legless Lizard (*Anniella pulchra pulchra*)	FS:S	DFG:SSC, ESSV, G3G4- T3T4/S3	IUCN:LC

Species	FEDERAL	STATE	Other Status
Birds			
ANATIDAE (ducks, geese, and swans)			
Brant (*Branta bernicla*)	PIF:WL MBTA	DFG:SSC, G5/SNR	IUCN:LC
Harlequin Duck (*Histrionicus histrionicus*)	FWS:SC MBTA	DFG:SSC, G4/S2	BLM:S IUCN:LC
GRAVIIDAE (loons)			
Common Loon (*Gavia immer*)	MBTA	DFG:SSC, G5/S1	IUCN:LC
PELICANIIDAE (pelicans)			
American White Pelican (*Pelecanus erythrorhynchos*)	MBTA	DFG:SSC, G3/S1	IUCN:LC
California Brown Pelican (*Pelecanus occidentalis californicus*)	ESA:FE MBTA	CESA:SE DFG:FP, G4T3/S1S2	IUCN:LC
PHALACROCORACIDAE (cormorants)			
Double-crested Cormorant (*Phalacrocorax auritus*)	MBTA	DFG:TW, G5/S3	IUCN:LC
ARDEIDAE (herons, egrets, and bitterns)			
Least Bittern (*Ixobrychus exilis*)	MBTA	DFG:SSC, G5/S1	IUCN:LC
ACCIPITRIDAE (hawks, kites, harriers, and eagles)			
Osprey (*Pandion haliaetus*)	MBTA	DFG:TW, G5/S3	IUCN:LC
White-tailed Kite (*Elanus leucurus*)	None	DFG:FP,TW, G5/S3	IUCN:LC
Northern Harrier (*Circus cyaneus*)	FWS:BCC MBTA	DFG:SSC, G5/S3	IUCN:LC
Sharp-shinned Hawk (*Accipiter striatus*)	MBTA	DFG:TW, G5/S3	IUCN:LC
Cooper's Hawk (*Accipiter cooperii*)	MBTA	DFG:TW, G5/S3	IUCN:LC
Ferruginous Hawk (*Buteo regalis*)	FWS:BCC, SC; MBTA	DFG:TW, G4/S3S4	BLM:S IUCN:LC
Golden Eagle (*Aquila chrysaetos*)	FWS:BCC MBTA	DFG:FP,TW, G5/S3	BLM:S IUCN:LC
FALCONIDAE (falcons)			
Merlin (*Falco columbarius*)	MBTA	DFG:TW, G5/S3	IUCN:LC
American Peregrine Falcon (*Falco peregrinus anatum*)	FWS:BCC MBTA	CESA:SE DFG:FP, G4T3/S2	IUCN:LC CITES:I
Prairie Falcon (*Falco mexicanus*)	FWS:BCC MBTA	DFG:TW, G5/S3	IUCN:LC

Species	FEDERAL	STATE	Other Status
Birds			
RALLIDAE (rails, coots, and gallinules)			
California Black Rail (*Laterallus jamaicensis coturniculus*)	FWS:BCC, SC; MBTA	CESA:ST DFG:FP, G4T1/S1	ABC:R NAS:R IUCN:NT
CHARADRIIDAE (plovers and relatives)			
Western Snowy Plover (*Charadrius alexandrinus nivosus*)	ESA:FT FWS:BCC MBTA	DFG:SSC, G4T3/S2	ABC:DY NAS:Y IUCN:LC
HAEMATOPODIDAE (oystercatchers)			
Black Oystercatcher (*Haematopus bachmani*)	FWS:BCC, SC; MBTA	DFG:G5/S2	IUCN:LC
SCOLOPACIDAE (sandpipers and relatives)			
Whimbrel (*Numenius phaeopus*)	FWS:BCC MBTA	None	IUCN:LC
Long-billed Curlew (*Numenius americanus*)	FWS:BCC, SC; MBTA	DFG:TW, G5/S2	ABC:DY NAS:Y IUCN:LC
Marbled Godwit (*Limosa fedoa*)	FWS:BCC MBTA	None	ABC:RY NAS:Y IUCN:LC
Black Turnstone (*Arenaria melanocephala*)	FWS:BCC MBTA	None	ABC:RY NAS:Y IUCN:LC
Sanderling (*Calidris alba*)	FWS:BCC MBTA	None	ABC:DY NAS:Y IUCN:LC
Short-billed Dowitcher (*Limnodromus griseus*)	FWS:BCC MBTA	None	IUCN:LC
LARIDAE (gulls and terns)			
Heermann's Gull (*Larus heermanni*)	MBTA	None	ABC:RY NAS:Y IUCN:NT
California Gull (*Larus californicus*)	MBTA	DFG:TW, G5/S2	IUCN:LC
Elegant Tern (*Sterna elegans*)	FWS:BCC MBTA	DFG:TW, G2/S1	ABC:RY NAS:Y IUCN:NT
Black Skimmer (*Rynchops niger*)	FWS:BCC MBTA	DFG:SSC, G5/S1S3	ABC:DY NAS:Y IUCN:LC
ALCIDAE (auklets, puffins, and relatives)			
Marbled Murrelet (*Brachyramphus marmoratus*)	ESA:FT MBTA	CESA:SE DFG:G3G4/S1	ABC:DY NAS:Y IUCN:EN

Species	FEDERAL	STATE	Other Status
Birds			
ALCIDAE (auklets, puffins, and relatives)			
Ancient Murrelet (*Synthliboramphus antiquus*)	MBTA	None	ABC:DY NAS:Y IUCN:LC
Cassin's Auklet (*Ptychoramphus aleuticus*)	FWS:BCC MBTA	DFG:SSC, G4/S2S4	IUCN:LC
Rhinoceros Auklet (*Cerorhinca monocerata*)	MBTA	DFG:TW, G5/S3	IUCN:LC
STRIGIDAE (owls)			
Western Burrowing Owl (*Athene cunicularia*)	FWS:BCC, SC; MBTA	DFG:SSC, G4/S2	BLM:S IUCN:LC CITES:II
California Spotted Owl (*Strix occidentalis occidentalis*)	FWS:BCC PIF:WL FS:S MBTA	DFG:SSC, G3T3/S3	ABC:R NAS:R BLM:S IUCN:NT
TROCHILIDAE (hummingbirds)			
Allen's Hummingbird (*Selasphorus sasin*)	PIF:WL MBTA	DFG:G5/SNR	ABC:RY NAS:Y IUCN:LC CITES:II
TYRANNIDAE (tyrant flycatchers)			
Olive-sided Flycatcher (*Contopus cooperi*)	FWS:BCC, SC; PIF:WL MBTA	DFG:SSC, G4/S4	ABC:DY NAS:Y IUCN:NT
Willow Flycatcher (*Empidonax traillii*)	PIF:WL FS:S MBTA	CESA:SE DFG:G5/S1S2	ABC:DY NAS:Y IUCN:LC
LANIIDAE (shrikes)			
Loggerhead Shrike (*Lanius ludovicianus*)	FWS:BCC MBTA	DFG:SSC, G4/S4	IUCN:LC
HIRUNDINIDAE (swallows)			
Purple Martin (*Progne subis*)	FWS:SC MBTA	DFG:SSC, G5/S3	IUCN:LC
PARIDAE (titmice and relatives)			
Oak Titmouse (*Baeolophus inornatus*)	PIF:WL MBTA	DFG:G5/S3	ABC:RY NAS:Y IUCN:LC
SYLVIIDAE (gnatcatchers)			
Wrentit (*Chamaea fasciata*)	PIF:WL	None	ABC:RY NAS:Y IUCN:LC
MIMIDAE (mockingbirds and thrashers)			
California Thrasher (*Toxostoma redivivum*)	PIF:WL MBTA	None	ABC:RY NAS:Y IUCN:LC

Species	FEDERAL	STATE	Other Status
Birds			
PARULIDAE (wood-warblers)			
Yellow Warbler (*Dendroica petechia brewsteri*)	MBTA	DFG:SSC, G5T3?/S2	IUCN:LC
EMBERIZIDAE (sparrows, buntings, warblers, and relatives)			
Large-billed Savannah Sparrow (*Passerculus sandwichensis rostratus*)	MBTA	DFG:SSC, G5T2T3/S2?	IUCN:LC
ICTERIDAE (blackbirds)			
Tricolored Blackbird (*Agelaius tricolor*)	FWS:BCC, SC; PIF:WL MBTA	DFG:SSC, G2G3/S2	ABC:R NAS:R BLM:S IUCN:EN
Mammals			
HETEROMYIDAE (kangaroo rats, pocket mice, and kangaroo mice)			
Morro Bay Kangaroo Rat (*Dipodomys heermanni morroensis*)	ESA:FE	CESA:SE DFG:FP, G3G4T1/S1	IUCN:LC (subsp. not noted)
MOLOSSIDAE (free-tailed bats)			
Big Free-tailed Bat (*Nyctinomops macrotis*)	None	DFG:SSC, G5/S2	WBWG:MP IUCN:LC
VESPERTILIONIDAE (vesper bats)			
Western Red Bat (*Lasiurus blossevillii*)	FS:S	DFG:SSC, G5/S3?	WBWG:HP IUCN:LC
Pallid Bat (*Antrozous pallidus*)	FS:S	DFG:SSC, G5/S3	WBWG:HP BLM:S IUCN:LC
Fringed Myotis (*Myotis thysanodes*)	None	DFG:SSC, G4G5/S4	WBWG:HP BLM:S IUCN:LC
Yuma Myotis (*Myotis yumanensis*)	None	DFG:G5/S4?	WBWG:LMP BLM:S IUCN:LC
Long-legged Myotis (*Myotis volans*)	FWS:SC (delisted)	DFG:SSC, G5/S4?	WBWG:HP IUCN:LC
Long-eared Myotis (*Myotis evotis*)	None	DFG:WL, G5/S4?	WBWG:MP BLM:S IUCN:LC
Western Small-footed Myotis (*Myotis ciliolabrum*)	None	DFG:G5/S2S3	WBWG:MP BLM:S IUCN:LC
PHOCIDAE (seals)			
Harbor Seal (*Phoca vitulina*)	MMPA	None	IUCN:LC

Species	FEDERAL	STATE	Other Status
Mammals			
MUSTELIDAE (weasels and relatives)			
American Badger (*Taxidea taxus*)	None	DFG:WL, G5/S4	IUCN:LC
Southern Sea Otter (*Enhydra lutris nereis*)	ESA:FT MMC:SSC MMPA	DFG:FP, G4T2/S2	IUCN:EN CITES:I
OTARIIDAE (sea lions and fur seals)			
Northern Fur Seal (*Callorhinus ursinus*)	MMPA	DFG:G3/S1	IUCN:VU
Stellar Sea Lion (*Eumetopias jubatus*)	ESA:FT MMC:SSC MMPA	DFG:G3/S2	IUCN:EN
California Sea Lion (*Zalophus californianus*)	MMPA	None	IUCN:LC

APPENDIX B
Sensitive Status of Vascular Plants and Lichens in the Morro Bay Area

Vascular Plant and Lichen Sensitive Status Code Abbreviations

FEDERAL
ESA:FE = Endangered Species Act - Federally listed as Endangered
ESA:FT = Endangered Species Act - Federally listed as Threatened
FS:S = USDA Forest Service - Sensitive Species

STATE
CESA:SE = California Endangered Species Act - State listed as Endangered
CESA:ST = California Endangered Species Act - State listed as Threatened
CDF:G/S = California Department of Fish & Game - California Heritage (CNDDB) Element Rank
(Please see 'California Heritage [CNDDB] Element Ranking for Plants' on page 20)

CNPS/Other
BLM:S = Bureau of Land Management - Sensitive Species
CLS:1B = California Lichen Society - Lichens Rare, Threatened, or Endangered in California and Elsewhere
CLS:2 = California Lichen Society - Lichens Rare, Threatened, or Endangered in California But More Common Elsewhere
CNPS:1B = California Native Plant Society - Plants Rare, Threatened, or Endangered in California and Elsewhere
CNPS:1B - .1/.2/.3 = California Native Plant Society - Threat Rank Extensions
0.1 = Seriously threatened in California (high degree/immediacy of threat)
0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

Species	FEDERAL	STATE	CNPS/Other
Vascular Plants			
ASTERACEAE (sunflower family)			
Blochman's Leafy Daisy (*Erigeron blochmaniae*)	None	DFG:G2/S2.2	CNPS:1B.2 BLM:S
Coulter's Goldfields (*Lasthenia glabrata coulteri*)	None	DFG:G4T3/ S2.1	CNPS:1B.1 BLM:S
Jones' Layia (*Layia jonesii*)	FS:S	DFG:G1/S1.1	CNPS:1B.2 BLM:S
BRASSICACEAE (mustard family)			
Beach Spectaclepod (*Dithyrea maritima*)	None	CESA:ST DFG:G2/S2.1	CNPS:1B.1
CARYOPHYLLACEAE (pink family)			
Marsh Sandwort (*Arenaria paludicola*)	ESA:FE FS:S	CESA:SE DFG:G1/S1.1	CNPS:1B.1
CHENOPODIACEAE (goosefoot family)			
California Seablite (*Suaeda californica*)	ESA:FE	DFG:G1/S1.1	CNPS:1B.1
CONVOLVULACEAE (morning-glory family)			
Cambria Morning-Glory (*Calystegia subacaulis episcopalis*)	FS:S	DFG:G3T1/ S1.2	CNPS:1B.2
CRASSULACEAE (stonecrop family)			
Betty's Dudleya (*Dudleya abramsii bettinae*)	None	DFG:G3T1/ S1.2	CNPS:1B.2
Blochman's Dudleya (*Dudleya blochmaniae blochmaniae*)	None	DFG:G2T2/ S2.1	CNPS:1B.1
ERICACEAE (heath family)			
Morro Manzanita (*Arctostaphylos morroensis*)	ESA:FT	DFG:G2/S2.2	CNPS:1B.1
Oso Manzanita (*Arctostaphylos osoensis*)	None	DFG:G1/S1.2	CNPS:1B.2
Pecho Manzanita (*Arctostaphylos pechoensis*)	None	DFG:G2/S2.2	CNPS:1B.2
Dacite Manzanita (*Arctostaphylos tomentosa daciticola*)	None	DFG:G4T1/ S1.1	CNPS:1B.1
HYDROPHYLLACEAE (waterleaf family)			
Indian Knob Mountainbalm (*Eriodictyon altissimum*)	ESA:FE	CESA:SE DFG:G2Q/ S2.2	CNPS:1B.1
POLYGONACEAE (buckwheat family)			
Brewer's Spineflower (*Chorizanthe breweri*)	FS:S	DFG:G2/S2.2	CNPS:1B.3 BLM:S
SCROPHULARIACEAE (figwort family)			
Obispo Indian Paintbrush (*Castilleja densiflora obispoensis*)	None	DFG:G5T2/ S2.2	CNPS:1B.2 BLM:S

Species	FEDERAL	STATE	CNPS/Other
Vascular Plants			
SCROPHULARIACEAE (figwort family)			
Salt Marsh Bird's-Beak (*Cordylanthus maritimus maritimus*)	ESA:FE	CESA:SE DFG:G4?T2/ S2.1	CNPS:1B.2
Lichens			
CLADONIACEAE (reindeer moss and cup lichens)			
Popcorn Lichen (*Cladonia firma*)	None	DFG:G4/S1.1	CLS:2/1B
PARMELIACEAE (largest lichen family)			
Black and White Tube Lichen (*Hypogymnia mollis*)	None	None	Endemic
Powdered Ruffle Lichen (*Parmotrema hypoleucinum*)	None	None	Endemic
Splitting Yarn Lichen (*Sulcaria isidiifera*)	None	DFG:G1/S1.1	CLS:1B
RAMALINACEAE (distinctive fruticose lichens)			
Armored Fog Lichen (*Niebla tuberculata*)	None	None	Endemic

APPENDIX C
Locality and Status of Sensitive Animals in the Morro Bay Area

Animal Locality and Status Code Abbreviations

ABUNDANCE AND STATUS CODES

The definition of these codes slightly varies from birds compared to other animals. Please see 'Abundance Designations' on page 12 for differences in meaning and additional information.

AB = Abundant
CA = Casual
CO = Common
LA = Locally Abundant
LC = Locally Common
OC = Occasional
R = Rare
UNC = Uncommon
VR - Very Rare

Endemic = Animals that are endemic to only the Morro Bay area.

SEASONAL STATUS AND NESTING CODES FOR BIRDS

These designations are used in addition to abundance codes if not followed by specific month periods for birds.

F = Fall
M = Migration
S = Summer
SP = Spring
YR = Year Round
W = Winter

PN = Potential Nesting

LOCALITY CODES

Locality designations represent known occurrences of animals within State Park Properties and Preserves of the Morro Bay area.

EFNP = Elfin Forest Natural Preserve
LOOR = Los Osos Oaks Reserve
MBSP = Morro Bay State Park (includes Morro Estuary Natural Preserve)
MDO = Montaña de Oro State Park (includes Morro Dunes Natural Preserve)
MRER = Morro Rock Ecological Reserve
MSSB = Morro Strand State Beach
SSNP = Sweet Springs Nature Preserve

Species	Breeding Period	Status	Locality
Invertebrates			
GASTROPODA (snails, slugs, and abalone)			
Morro Shoulderband Snail (*Helminthoglypta walkeriana*)	Rainy season	LC, Endemic	EFNP,LOOR, MBSP,MDO, MSSB
INSECTA, Order Coleoptera (beetles)			
Sandy Beach Tiger Beetle (*Cicindela hirticollis gravida*)	Eggs laid June to July	UNC	MDO
Globose Dune Beetle (*Coelus globosus*)	Unknown	UNC	MDO, MSSB?
Morro 10-lined June Beetle (*Polyphylla* species novae *'morroensis'*)	Unknown	UNC, Endemic	EFNP,LOOR, MBSP,MDO
INSECTA, Order Lepidoptera (butterflies and moths)			
'Morro' Boisduval's Blue (*Plebejus icarioides 'moroensis'*)	March to July	LC, Endemic	MBSP,MDO, MSSB
Fishes			
SALMONIDAE (trout and salmon)			
Coastal Rainbow Trout (*Oncorhynchus mykiss irideus*)	Dec. to April	LC	MBSP
GOBIIDAE (gobies)			
Tidewater Goby (*Eucyclogobius newberryi*)	Throughout the year	UNC	MBSP
Amphibians			
RANIDAE (true frogs)			
California Red-legged Frog (*Rana aurora draytonii*)	Nov. to April	LC	MBSP,MSSB
Reptiles			
EMYDIDAE (box and water turtles)			
Southwestern Pond Turtle (*Actinemys marmorata pallida*)	April to Aug.	LC	MBSP,MSSB, SSNP
PHRYNOSOMATIDAE (spiny lizards)			
California Horned Lizard (*Phrynosoma coronatum frontale*)	April to July	LC	MBSP,MDO, MSSB
ANNIELLIDAE (legless lizards)			
Silvery Legless Lizard (*Anniella pulchra pulchra*)	March to July	LC	MBSP,MDO

Species	Breeding Period	Status	Locality
Birds			
ANATIDAE (ducks, geese, and swans)			
Brant (*Branta bernicula*)	May to Sep.	CO:Nov-Mar	MBSP
Harlequin Duck (*Histrionicus histrionicus*)	April to Sep.	R:Oct-Mar CA:S	MSSB
GRAVIIDAE (loons)			
Common Loon (*Gavia immer*)	April to Aug.	CO:W, UNC:S	MBSP
PELICANIIDAE (pelicans)			
American White Pelican (*Pelecanus erythrorhynchos*)	March to April	CO:Jul-Apr UNC:Apr-Jul	MBSP
California Brown Pelican (*Pelecanus occidentalis californicus*)	March to April	CO:May-Dec PN	MBSP,MDO, MRER,MSSB
PHALACROCORACIDAE (cormorants)			
Double-crested Cormorant (*Phalacrocorax auritus*)	April to Sept.	CO:YR Nester	MBSP,MDO, MRER,MSSB
ARDEIDAE (herons, egrets, and bitterns)			
Least Bittern (*Ixobrychus exilis*)	May to Aug.	R:S PN	Unknown
ACCIPITRIDAE (hawks, kites, harriers, and eagles)			
Osprey (*Pandion haliaetus*)	March to Sept.	UNC:YR PN	MBSP, MDO, MSSB, SSNP
White-tailed Kite (*Elanus leucurus*)	Feb. to Oct.	LC:YR PN	EFNP,LOOR, MBSP, MDO, SSNP
Northern Harrier (*Circus cyaneus*)	March to Aug.	CO:W PN	EFNP,LOOR, MBSP, MDO, SSNP
Sharp-shinned Hawk (*Accipiter striatus*)	April to Aug.	UNC:Sep-May CA:S	EFNP,LOOR, MBSP, MDO, MSSB
Cooper's Hawk (*Accipiter cooperii*)	May to Sept.	UNC:W, R:S, PN	LOOR
Ferruginous Hawk (*Buteo regalis*)	April to Oct.	R:Oct-Mar	LOOR,MBSP, MDO
Golden Eagle (*Aquila chrysaetos*)	April to Oct.	UNC:YR PN	MBSP, MDO
FALCONIDAE (falcons)			
Merlin (*Falco columbarius*)	April to Sept.	UNC:Sep-Apr	All
American Peregrine Falcon (*Falco peregrinus anatum*)	March to Aug.	UNC:W Nester	MRER

Species	Breeding Period	Status	Locality
Birds			
FALCONIDAE (falcons)			
Prairie Falcon (*Falco mexicanus*)	Feb. to Sept.	R:F&W	LOOR,MBSP, MDO
RALLIDAE (rails, coots, and gallinules)			
California Black Rail (*Laterallus jamaicensis coturniculus*)	March to June	R:YR Nester	MBSP, MDO, SSNP
CHARADRIIDAE (plovers and relatives)			
Western Snowy Plover (*Charadrius alexandrinus nivosus*)	April to Oct.	CO:Apr-Oct	MDO, MSSB
HAEMATOPODIDAE (oystercatchers)			
Black Oystercatcher (*Haematopus bachmani*)	April to Aug.	CO:YR Nester	MBSP, MDO, MRER,MSSB
SCOLOPACIDAE (sandpipers and relatives)			
Whimbrel (*Numenius phaeopus*)	June to Aug.	UNC:W	MDO, MSSB
Long-billed Curlew (*Numenius americanus*)	April to Aug.	CO:W UNC:S	MBSP, MDO, MSSB
Marbled Godwit (*Limosa fedoa*)	May to Aug.	UNC:W OC:S	MBSP, MDO, MSSB
Black Turnstone (*Arenaria melanocephala*)	May to Aug.	CO:W	MBSP, MDO, MSSB
Sanderling (*Calidris alba*)	May to Aug.	CO:W	MBSP, MDO, MSSB
Short-billed Dowitcher (*Limnodromus griseus*)	May to Aug.	UNC:Aug-May	MBSP, MDO
LARIDAE (gulls and terns)			
Heermann's Gull (*Larus heermanni*)	Feb. to June	AB:Jun-Nov	MBSP, MDO, MRER,MSSB
California Gull (*Larus californicus*)	May to Sept.	OC:W UNC:S	MBSP, MDO, MRER,MSSB
Elegant Tern (*Sterna elegans*)	July to Oct.	UNC:Jun-Nov	MBSP, MDO, MSSB
Black Skimmer (*Rynchops niger*)	April to Sept.	R:YR Rooster	MBSP, MDO, MSSB
ALCIDAE (auklets, puffins, and relatives)			
Marbled Murrelet (*Brachyramphus marmoratus*)	April to Sept.	R:W	Offshore
Ancient Murrelet (*Synthliboramphus antiquus*)	June to Aug.	R:W	Offshore

Species	Breeding Period	Status	Locality
Birds			
ALCIDAE (auklets, puffins, and relatives)			
Cassin's Auklet (*Ptychoramphus aleuticus*)	Jan. to Aug.	UNC:Sep-Apr	Offshore
Rhinoceros Auklet (*Cerorhinca monocerata*)	Feb. to June	UNC:Nov-Mar	Offshore
STRIGIDAE (owls)			
Western Burrowing Owl (*Athene cunicularia*)	March to Aug.	R:Oct-Mar	MBSP
California Spotted Owl (*Strix occidentalis occidentalis*)	March to Aug.	UNC:W	MDO
TROCHILIDAE (hummingbirds)			
Allen's Hummingbird (*Selasphorus sasin*)	March to June	CO:S Nester	LOOR,MBSP, MDO
TYRANNIDAE (tyrant flycatchers)			
Olive-sided Flycatcher (*Contopus cooperi*)	May to Aug.	UNC:Apr-Oct PN	MBSP, MDO, SSNP
Willow Flycatcher (*Empidonax traillii*)	June to Aug.	UNC:May-Jun UNC:Aug-Oct	All
LANIIDAE (shrikes)			
Loggerhead Shrike (*Lanius ludovicianus*)	Jan. to July	CO:W PN	All
HIRUNDINIDAE (swallows)			
Purple Martin (*Progne subis*)	April to Aug.	R:M	EFNP,LOOR, MBSP, MDO, SSNP
PARIDAE (titmice and relatives)			
Oak Titmouse (*Baeolophus inornatus*)	March to June	CO:YR Nester	EFNP, MBSP, SSNP
SYLVIIDAE (gnatcatchers)			
Wrentit (*Chamaea fasciata*)	March to Sept.	CO:YR Nester	EFNP,LOOR, MBSP, MDO, SSNP
MIMIDAE (mockingbirds and thrashers)			
California Thrasher (*Toxostoma redivivum*)	Feb. to June	UNC:YR Nester	EFNP,LOOR, MBSP, MDO, SSNP
PARULIDAE (wood-warblers)			
Yellow Warbler (*Dendroica petechia brewsteri*)	April to Aug.	UNC:Apr-Sep PN	EFNP,LOOR, MBSP, MDO, SSNP
EMBERIZIDAE (sparrows, buntings, warblers, and relatives)			
Large-billed Savannah Sparrow (*Passerculus sandwichensis rostratus*)	May to Sept.	UNC:Aug-Mar	MBSP, MDO, SSNP

Species	Breeding Period	Status	Locality
Birds			
ICTERIDAE (blackbirds)			
Tricolored Blackbird (*Agelaius tricolor*)	March to Aug.	UNC:YR Nester	MBSP
Mammals			
HETEROMYIDAE (kangaroo rats, pocket mice, and kangaroo mice)			
Morro Bay Kangaroo Rat (*Dipodomys heermanni morroensis*)	Feb. to Oct.	Extirpated (?)	EFNP,LOOR, MBSP, MDO
MOLOSSIDAE (free-tailed Bats)			
Big Free-tailed Bat (*Myotis yumanensis*)	Fall to Winter	R	Unknown
VESPERTILIONIDAE (vesper Bats)			
Western Red Bat (*Lasiurus blossevillii*)	Summer to Fall	UNC	Unknown
Pallid Bat (*Antrozous pallidus*)	Oct. to Feb.	UNC	Unknown
Fringed Myotis (*Myotis thysanodes*)	Fall	R	Unknown
Yuma Myotis (*Myotis yumanensis*)	Fall to Winter	UNC	Unknown
Long-legged Myotis (*Myotis volans*)	Fall	UNC	Unknown
Long-eared Myotis (*Myotis evotis*)	Fall to Winter	UNC	Unknown
Western Small-footed Myotis (*Myotis ciliolabrum*)	Fall to Winter	UNC	Unknown
PHOCIDAE (seals)			
Harbor Seal (*Phoca vitulina*)	April to June	CO	MBSP, MDO, MSSB
MUSTELIDAE (weasels and relatives)			
American Badger (*Taxidea taxus*)	Aug. to Jan.	UNC	MBSP, MDO
Southern Sea Otter (*Enhydra lutris nereis*)	Throughout the year	OC	MBSP, MDO, MSSB
OTARIIDAE (sea lions and fur seals)			
Northern Fur Seal (*Callorhinus ursinus*)	June to Oct.	R	None
Stellar Sea Lion (*Eumetopias jubatus*)	May to August	R	None
California Sea Lion (*Zalophus californianus*)	Mat to August	CO	MBSP, MDO, MSSB

APPENDIX D
Locality and Status of Sensitive Vascular Plants and Lichens in the Morro Bay Area

Vascular Plant and Lichen Locality and Status Code Abbreviations

ABUNDANCE AND STATUS CODES

The definition of these codes can be found in the 'Abundance Designations' section on page 12 of this reference.

AB = Abundant
CO = Common
LA = Locally Abundant
LC = Locally Common
OC = Occasional
UNC = Uncommon

Endemic = Vascular plants and lichens that are endemic to only San Luis Obispo County, California.

LOCALITY CODES

Locality designations represent known occurrences of vascular plants and lichens within State Park Properties and Preserves of the Morro Bay area.

EFNP = Elfin Forest Natural Preserve
LOOR = Los Osos Oaks Reserve
MBSP = Morro Bay State Park (includes Morro Estuary Natural Preserve)
MDO = Montaña de Oro State Park (includes Morro Dunes Natural Preserve)
MRER = Morro Rock Ecological Reserve
MSSB = Morro Strand State Beach
SSNP = Sweet Springs Nature Preserve

Species	Blooming Period	Status	Locality
Vascular Plants			
ASTERACEAE (sunflower family)			
Blochman's Leafy Daisy (*Erigeron blochmaniae*)	July to Aug.	LC	MBSP, MDO
Coulter's Goldfields (*Lasthenia glabrata coulteri*)	April to May	UNC	SSNP
Jones' Layia (*Layia jonesii*)	March to May	UNC, Endemic	MBSP, MSSB
BRASSICACEAE (mustard family)			
Beach Spectaclepod (*Dithyrea maritima*)	March to May	UNC	MBSP
CARYOPHYLLACEAE (pink family)			
Marsh Sandwort (*Arenaria paludicola*)	May to Aug.	UNC	SSNP
CHENOPODIACEAE (goosefoot family)			
California Seablite (*Suaeda californica*)	July to Oct.	LC	MBSP, MDO SSNP
CONVOLVULACEAE (morning-glory family)			
Cambria Morning-Glory (*Calystegia subacaulis episcopalis*)	April to June	CO, Endemic	LOOR, MBSP
CRASSULACEAE (stonecrop family)			
Betty's Dudleya (*Dudleya abramsii bettinae*)	May to July	Unknown, Endemic	MBSP?
Blochman's Dudleya (*Dudleya blochmaniae blochmaniae*)	April to June	UNC	MBSP
ERICACEAE (heath family)			
Morro Manzanita (*Arctostaphylos morroensis*)	Dec. to March	LC, Endemic	EFNP, LOOR MBSP, MDO
Oso Manzanita (*Arctostaphylos osoensis*)	Feb. to March	LC, Endemic	MBSP
Pecho Manzanita (*Arctostaphylos pechoensis*)	Jan. to March	UNC, Endemic	None
Dacite Manzanita (*Arctostaphylos tomentosa daciticola*)	March to May	UNC, Endemic	None
HYDROPHYLLACEAE (waterleaf family)			
Indian Knob Mountainbalm (*Eriodictyon altissimum*)	March to June	UNC, Endemic	MDO
POLYGONACEAE (buckwheat family)			
Brewer's Spineflower (*Chorizanthe breweri*)	April to Aug.	UNC	Unknown
SCROPHULARIACEAE (figwort family)			
Obispo Indian Paintbrush (*Castilleja densiflora obispoensis*)	March to May	UNC	MBSP

Species	Blooming Period	Status	Locality
Vascular Plants			
SCROPHULARIACEAE (figwort family)			
Salt Marsh Bird's-Beak (*Cordylanthus maritimus maritimus*)	May to Oct.	UNC	MDO, SSNP
Lichens			
CLADONIACEAE (reindeer moss and cup lichens)			
Popcorn Lichen (*Cladonia firma*)	Unknown	LC	MBSP, MDO
PARMELIACEAE (largest lichen family)			
Black and White Tube Lichen (*Hypogymnia mollis*)	Unknown	UNC	EFNP,LOOR, MBSP
Powdered Ruffle Lichen (*Parmotrema hypoleucinum*)	Unknown	UNC	EFNP,LOOR, MBSP
Splitting Yarn Lichen (*Sulcaria isidiifera*)	Unknown	UNC, Endemic	EFNP,LOOR, MBSP
RAMALINACEAE (Distinctive Fruticose Lichens)			
Armored Fog Lichen (*Niebla tuberculata*)	Unknown	UNC, Endemic	MBSP,MREP

APPENDIX E
Selected Maps of the Morro Bay Area

The following is an assemblage of maps focused on the Morro Bay atlas project area. They are provided as a visual aid to text and distribution maps, and for general reference. Information about how maps were created and full sources of data can be found in the 'About the Maps' section on page 29 of this report.

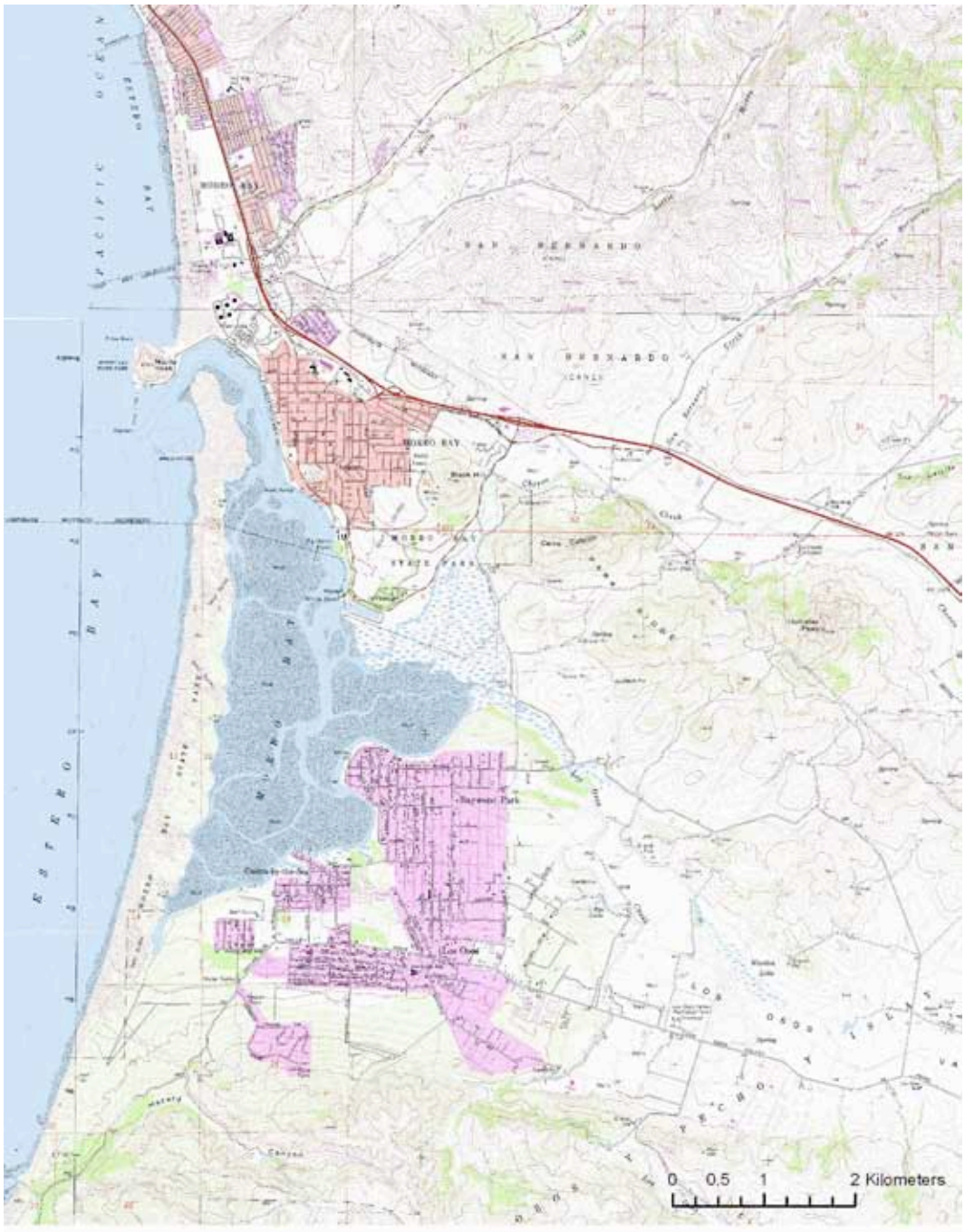
SELECTED MAPS

Contents

Aerial Image of the Morro Bay Area

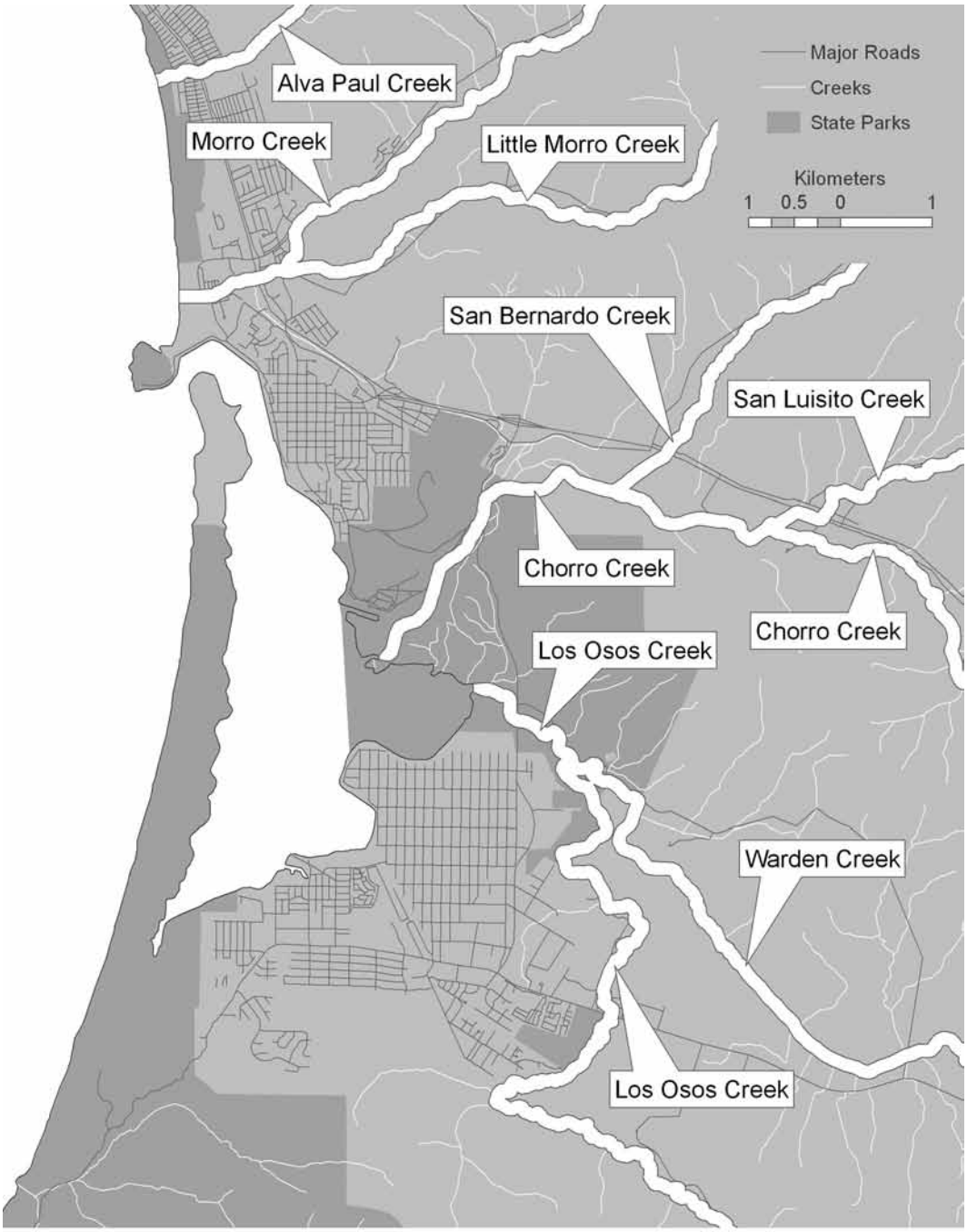
2005 NAIP Aerial Imagery

Topographical Map of the Morro Bay Area

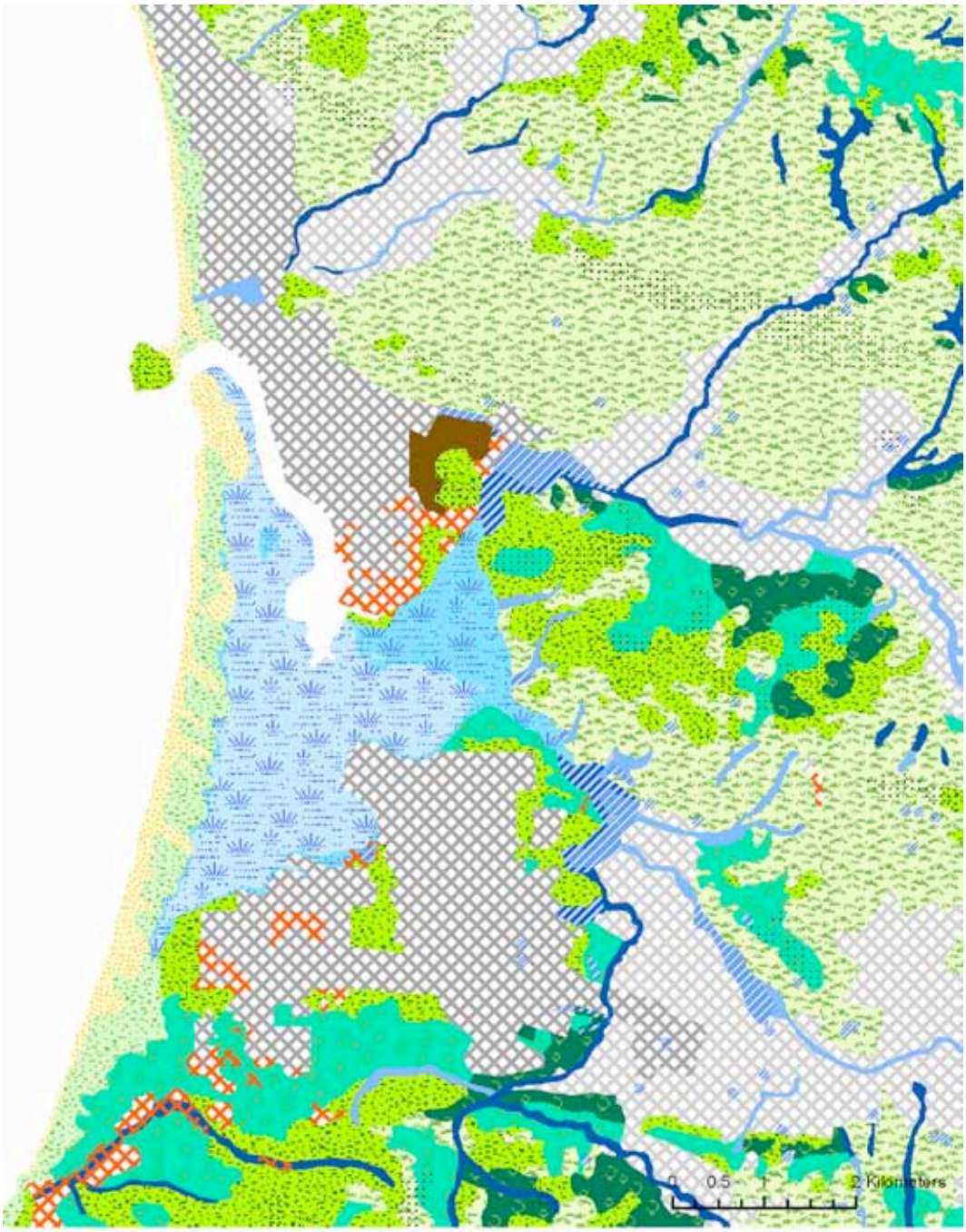


USGS - California 7.5-minute DRG

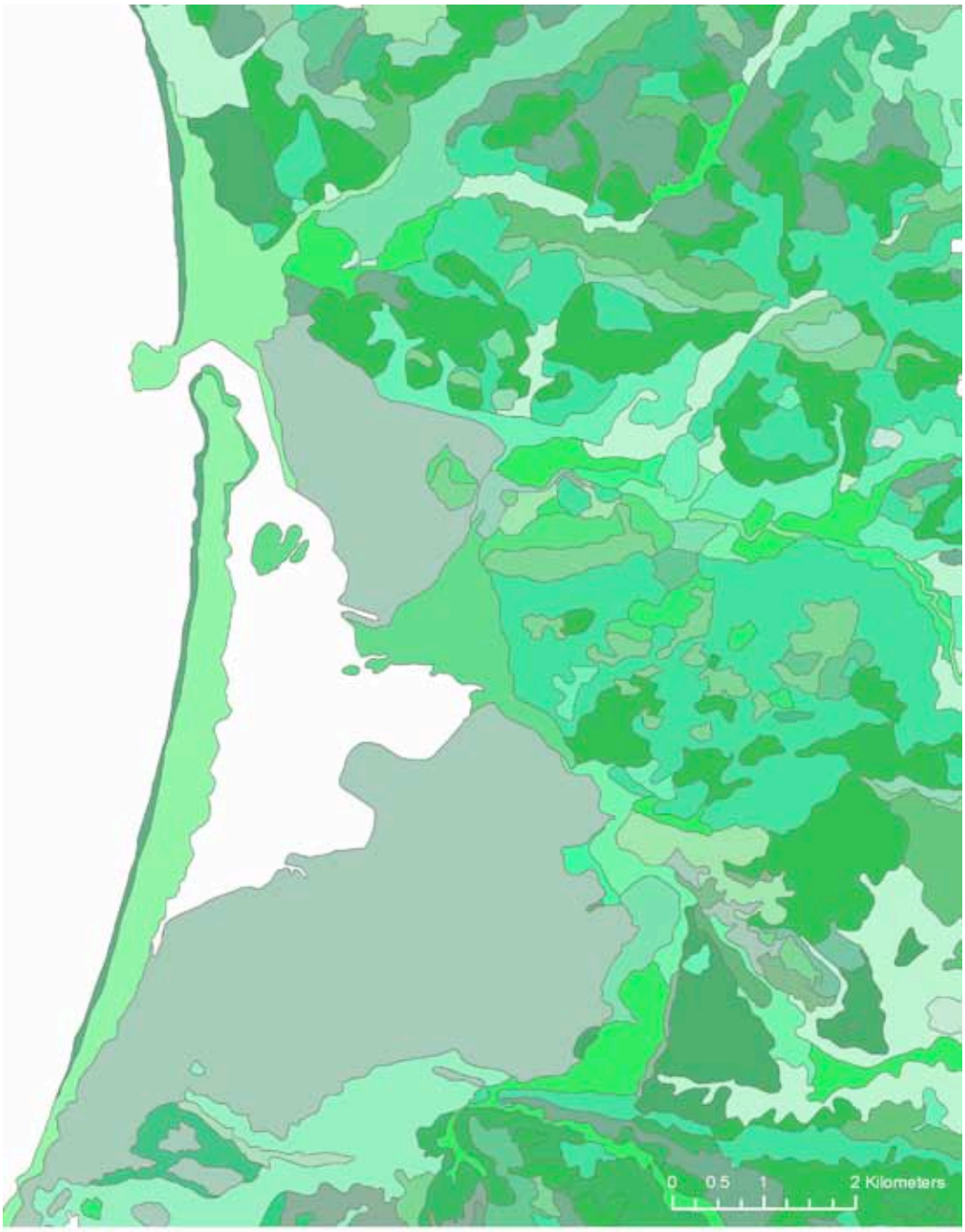
Major Creeks of the Morro Bay Area



Selected Habitats of the Morro Bay Area



Soils of the Morro Bay Area



San Luis Obispo County and the
National Resource Conservation Service Soil Survey Division (1999).

Legend of Soils of the Morro Bay Area

State Park Properties and Preserves of the Morro Bay Area