Fauna of the Guadalupe-Nipomo Dunes

Dunes Collaborative
Guadalupe, California

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Prepared for:
Dunes Collaborative
1055 Guadalupe Street
Guadalupe, CA 93434
(805) 343-2455

Prepared by:
Jim Blecha
Cindy Cleveland
Dave Innis
Wayne Vogler

Terrestrial Aquatic Biologists
158 Baker Ave
Shell Beach CA 93449
Pismo Beach, CA 93433
(805) 773-1178

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EXECUTIVE SUMMARY

Methods

The Guadalupe-Nipomo Dunes (GND) cover approximately 20,000 acres of relatively pristine coastal California dune habitats, extending from Point Sal, Santa Barbara County north to Pismo Pier, San Luis Obispo County. Ownership of parcels in the GND includes various federal, state, and county (San Luis Obispo and Santa Barbara) agencies, as well as private owners. The Dune Collaborative (DC) was formed of existing owners and managers following a settlement from Unocal as a result of a petroleum discharge. A central concept in the formation of the DC was for all owners and managers to work together to understand and manage the dunes on an ecosystem scale rather than on a parcel-by-parcel scale. This project, funded by the DC, is one step in that direction.

This report is an attempt to answer the following questions from the available literature:

- What animals occur in the GND and what are their habitat associations;
- Which animals are special-status species;
- How might animals in the GND be impacted by current methods for invasive weed species

The primary information sources are presented in an annotated bibliography. Six wildlife studies form the 'core reports' for wildlife characterizations in the GND: Smith et al. 1976, Unocal 1999-2004, Entrix Inc. 1996, Dames and Moore 1979, Burton and Kutilek 1991, and Kutilek, Shellhammer and Bros 1991.

Five invasive plant species are the highest priority for removal from the GND: veldt grass (*Ehrharta calycina*), beach grass (*Ammophila arenaria*), pampas grass (*Cortaderia jubata*), ice plant (*Carpobrotus edulis* and *C. chilensis*) and slender-leaved ice plant (*Conicosia pugioniformis*). Four methods are employed to control these plant species: 1) herbicides 2) mechanical removal 3) controlled burns and 4) grazing. Of these, herbicide application is the primary tool for invasive plant control in the GND. The primary herbicides used are Roundup® and Fusilade®, which are applied specifically to the target invasive plants with little to no overspray.

The list of taxa known to occur or suspected to occur in the GND are presented in Appendices A through E, representing, respectively, invertebrates, amphibians, reptiles, birds, and mammals. Appendix F presents the total number of faunal taxa known to occur in the GND. In order to make this document a more complete catalog of the faunal taxa known to be associated with the GND, Appendix G presents the freshwater fishes known to occur in the various streams, lakes and ponds in the GND and

Appendix H presents the marine animals reported to occur in the tidal wetlands and nearshore waters of the GND, and includes invertebrates, fishes, and marine mammals.

There is a chapter for each of the five major faunal groups (invertebrates, amphibians, reptiles, mammals, and birds) which contains the number of species (taxa) confirmed to occur for that group, the habitat relationships, and a brief account of their general biology. For each special-status species a brief summary of its known habitats in the GND and other areas, its present status in the GND, a brief life history, and, in most cases, how it may be affected by current invasive weed control measures are presented. In addition, for each of the five faunal categories there is a related appendix containing the GND habitats a species is known or suspected to occur in, its legal status, and related reference sources. Supporting the results of the literature searches are chapters on GND habitat descriptions and discussions of current weed control methods and possible impacts to faunal species.

<u>Results</u>

Approximately 330 invertebrate taxa are known from the GND, which is approximately 45% of the 725 verified GND faunal species. Five species of invertebrates, all insects, have been first collected and described (holotypes) from GND habitats and are considered GND endemic species. These include: three moth species (*Gnorimoschema baccharisselloides*, *G. ericoides*, and the Oso Flaco flightless moth *Areniscythris brachypteris*), one robber fly (*Ablautus schlingeri*), and one scarab beetle, (*Lichnanthe albipilosa*). Additionally, one butterfly subspecies, the Oso Flaco patch butterfly (*Chlosyne leanira osoflaco* or *Thessalia leanira elegans*) is known only from the GND. An additional 15 invertebrate taxa are considered special-status species.

Guadalupe-Nipomo Dune amphibian species are represented by eight confirmed frog, toad, and salamander species. An additional four other species are mentioned in the literature as possibly occurring in the GND but their presence has not been confirmed. None of the confirmed amphibian species are GND endemics. The low number of known amphibian species is likely due to the limited number of surveys within the GND, with the possible exception of studies at the Guadalupe Oil Field. Three of the confirmed amphibians are special-status species: western spadefoot toad (*Spea hammondii*), western toad (*Bufo boreas*), and the California red-legged frog (*Rana aurora draytonii*). All four of the unconfirmed amphibian taxa are special-status.

Guadalupe-Nipomo Dune reptile species are represented by 21 confirmed species. Five additional taxa may be present but their presence in the GND is currently unconfirmed. None of the confirmed reptile species are GND endemics. There are four special-status reptile species: southwestern pond turtle (*Clemmys marmorata pallida*), California horned-lizard (*Phymosoma coronatum frontale*), silvery legless lizard (*Anniella pulchra pulchra*), and two-striped garter snake (*Thamnophis hammondii*).

Thirty-three (33) mammal species are confirmed to occur in the GND. There are no known threatened, endangered, or endemic mammals in the GND, and only one species is a special-status. There are three additional GND mammals of local interest, for which species accounts are provided; American black bear (*Ursus americanus*), mountain lion (*Puma concolor*), and American badger (*Taxidea taxus*). An additional 24 mammal species have been reported as possibly occurring in the GND, but their presence has not been documented. Most of these unconfirmed mammals are bats (15 species) and rodents (6 species).

No studies, collections, or authoritative observations of bats have been conducted at the GND. However, based on a recent exhaustive study of bats on Vandenberg Air Force Base, and personal communication from one of the principle researchers, five special-status bat species may be reasonably expected to occur in the GND. Therefore, although their presence in the GND is not confirmed, species accounts are provided for: Yuma myotis (*Myotis yumanensis*), pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), western red bat (*Lasiurus blossevilli*), and western mastiff bats (*Eumops perotis*).

There are 314 birds confirmed to occur in the GND; various researchers suspect the presence of another 31 bird species. The total number of bird species known to be present in the GND is impressive and compares favorably with other nearby coastal areas known for their rich avian fauna. Among several explanations for the high number of birds in the GND, two are significant: the large area of quality terrestrial and aquatic habitat present in the dunes and the presence of many highly respected local "birders", most of who are involved in the Morro Coast Audubon Society.

A total of 86 bird species were special-status species, and account for 26% of all bird species known to occur in the GND. Based on their formal listing status (e.g. federal or state threatened), the special-status species were designated as either a Category 1 species (very sensitive), Category 2 species (sensitive), or Category 3 species (of some concern). Based on this classification, of the 86 special-status bird species, 14 are Category 1, 31 are Category 2, and 41 are Category 3.

This report documents approximately 725 taxa of primarily terrestrial animals as occurring in the GND. An additional 60 or so taxa have been suggested as occurring but are not documented in any study to date. If the number of fish species documented from the various wetlands (20 species) are added, along with the number of marine animals (181 taxa) found in the near shore waters of the GND, the total number of animal taxa associated with the GND is a little over 900 species or subspecies.

1.0 INTRODUCTION

In 1976, approximately 70 percent of the Guadalupe-Nipomo Dunes (GND or dunes) was privately owned, including the Oso Flaco Lakes (Smith et al. 1976). Privately owned dune areas were maintained for hunting, mineral extraction, or development potential. Lands owned by public agencies such as California State Parks and San Luis Obispo and Santa Barbara Counties were managed for active recreational activities such as off-road vehicles, surfing, and fishing (Smith et al. 1976). For decades, access to the dunes was primarily by vehicle. Oceano Dunes State Off-Highway Vehicular Recreational Area was, and remains, among one of the most popular state parks in California, with up to two million visitors per year. In the latter 1980's, conservation groups such as the California Coastal Conservancy, Land Conservancy of San Luis Obispo County, and The Nature Conservancy purchased lands to be used by the public for more passive recreational pursuits.

A number of events took place following the 1990 discovery of a massive petroleum product spill in the Unocal Guadalupe Oil Field (GOF). Opportunities for a new management approach for dune resources, which had historically been on a parcel-by-parcel basis, were created following the 1998 legal settlement by Unocal. Nine million dollars was dedicated to fund projects to restore, replace or acquire natural resources in the dunes. This money was placed in a trust account established with the National Fish and Wildlife Foundation and managed by a Restoration Subcommittee, comprised of members from the California Coastal Conservancy and the California Department of Fish and Game – Office of Oil Spill Response and Prevention. In 2000, land acquisition led to the establishment of the U.S. Fish and Wildlife Service Guadalupe-Nipomo Dunes National Wildlife Refuge.

1.1 Dunes Stewardship Collaborative

The Dune Stewardship Collaborative (DSC), now called the Dunes Collaborative (DC) or Collaborative, was formed between federal, state, private, and non-profit organization landowners, local representatives, academic institutions, and individuals. It is committed to restoration of coastal dune habitats, recovery of threatened and endangered species and providing quality visitor experiences to the dune systems. The DC assists the Restoration Subcommittee in prioritizing, implementing, and managing restoration projects within the dunes. The Collaborative submitted an innovative and successful proposal to the Restoration Subcommittee to use part of the $9 million settlement funds to establish an endowment as an instrument to supply funds, in perpetuity, for projects that would insure the long-term protection and enhancement of the dune ecosystem. With the establishment of the Collaborative, potential exists to manage the dunes as an entire ecosystem, rather than as isolated parcels.

An important goal of the Collaborative is to restore, enhance, and maintain the natural resources of coastal dune habitats. Collaborative priorities include monitoring and management of western snowy plovers, GIS and data base management, site specific restoration plans, resource inventories, and establishment of a restoration nursery (DSC 2002). As their top priority, theCollaborative identified management of non-native invasive plant species (weeds) and protection of intact ecosystems within the dunes from these weed species.

Weed management has been an ongoing process in the GND for several decades with individual landowners practicing their own methods. Weed removal methods used by the various landowners in the dunes have included burning, grazing, hand-removal (shovels, rakes, etc.), mechanical removal (bulldozing), and use of various herbicides. The Land Conservancy of San Luis Obispo (LCSLO or Conservancy) became active in the GND in the late 1980's with their involvement with Black Lake and Black Lake Canyon (BLC). As a landowner in the canyon in 1990 and acquisition of land surrounding and including Black Lake in 1997, the Conservancy was interested in conservation, and possible enhancement, of the valuable biological resources in and around BLC and Black Lake. Through their contacts with other private landowners, and their desire to practice sound stewardship of the biological resources, the Conservancy ventured into weed management. In 1998 the Conservancy was awarded a two-year Coastal Resource Grant from San Luis Obispo County to remove invasive weeds (primarily beach grass and veldt grass) from the dunes. The Conservancy began this undertaking with a step-wise approach to:

- identify land management units based on homogenous sets of botanic and dune morphological characteristics;
- set and map restoration priorities based on the level of threat from weeds to sensitive plant species; and
- test effectiveness of different removal techniques involving manual labor, chemicals, and grazing.

Control of invasive plant species in the GND, with the exception of the GOF (or as it is now termed the Guadalupe Remediation Site) is undertaken primarily by the Conservancy. Their invasive plant control program was funded by the Collaborative first as an interim project, then as an ongoing endowment project, one that is expected to be funded until project goals are accomplished.

1.2 Project Description

Current restoration projects in the dunes involve mainly removal of invasive, non-native weeds and revegetation with native plants. The Collaborative understood that these activities may have some potential to impact biological resources other than the targeted invasive plant species. In order to be responsible stewards of all dune biological resources, the Collaborative sought answers to the following questions regarding dune fauna:

- What are the biological associations within the dune plant communities?
- What vertebrate and invertebrate species are associated with the diverse habitats that make up the dunes as a whole?
- Which of these biological resources, terrestrial and aquatic, are considered rare or sensitive?
- What types of plant communities should we be giving special consideration to protecting or restoring for the benefit of the species?
- Which of these biological resources do we know the least and most about?
- Which needs additional research and why?
- Are there critical resources that demand immediate attention?
- Which of biological resources of the dunes could be adversely affected by the existing exotic plant species eradication program?
- Are there particular species that should be examined in more detail as indicators of the biological integrity of the dunes as a whole?

This report is an attempt to answer these questions using existing literature sources. The GND fauna with the highest potential, but which may still be rather minor, to show impacts from the invasive plant control program are the terrestrial and wetland aquatic species. Because it did not exist previously, the scope of this project was expanded to include a master species list of all GND fauna reported in the existing literature. These taxa are listed as either being present (confirmed) or suspected of being present (presence unconfirmed) in the GND along with the reference of its occurrence. The rational for this list is best stated by ecologist Aldo Leopold as, “the first rule in intelligent tinkering is to understand what you start with.”

1.3 Approach

This report is a synthesis of the results of studies in the GND that are reported in the literature; no biological studies were conducted as a part of this project. Strictly marine animals (invertebrates, fish, mammals, and some pelagic birds not otherwise reported in the literature) are not included. However, for convenience and to make this document a more complete listing of the fauna of the GND, these groups of marine animals are included, along with references to their occurrence, in the Appendix H.

The question as to what species occur in the GND is addressed in the species lists presented in Appendices A – E covering invertebrates, amphibians, reptiles, birds, and mammals, respectively. These appendices list the taxa, their dune habitat associations, and the reference citing the presence of that taxa in the GND. Amphibian, reptile, bird, and mammal taxa that may be present in the GND but whose presence is not confirmed (by direct observation by researchers or knowledgeable individuals) are also listed along with their probable habitat associations and citation reference. Special-status species are identified for both confirmed and unconfirmed taxa. Appendix H is a compliation of the known number of species in the GND compared to previous GND studies. Inorder to make this document a more complete catalog of the faunal taxa known to be associated with the GND, Appendix G presents the freshwater fishes known to occur in the various streams, lakes and ponds in the GND and Appendix H presents the marine animals reported to occur in the tidal wetlands and nearshore waters of the GND, including invertebrates, fishes and marine mammals.

The question of a species that may be of value as an indicator of overall ecosystem health (integrity) is left largely unanswered.

Chapter 2 describes the methods for invasive plant control currently in use in the GND. The following 6 chapters present aspects of the general biology and ecology of each of the main faunal groups as to how they may be potentially affected by these invasive plant control methods. A general discussion of potential impacts of herbicides currently in use in the GND is provided for each faunal group. However, since there is very little information on the effects of herbicides on the species present in the GND, this discussion is necessarily speculative. For each faunal group, special-status species are identified and a more complete description is provided of the relevant aspects of their biology and ecology, in so far as it is known, as to their potential for being affected by the invasive plant control methods.

1.4 Geographical Extent

As stated in the, Draft Dunes Stewardship Collaborative Revised Operating Procedures, dated June 1, 2004, “the dunes encompass over 18,000 acres from Point Sal to Arroyo Grande Creek and from the shoreline to the inland extent of the active sand dune formations. This includes the coastal creeks, estuaries and watersheds that support the dunes”. The intent of this statement with regard to watersheds is interpreted here as including only the Black Lake Canyon watershed. Therefore, two areas will be considered: the dunes proper as defined above and Black Lake Canyon. These two areas are not cleanly separated but represent a geological continuum from younger dunes to older ones as well as a biological continuum from open, active sand dunes to thickly vegetated, stabilized dunes.

There is in the literature a general consensus of the extent of the GND but some variation exists. The lateral extent of the GND has been variously stated as about 16 miles from north to south to over 18 miles and the area described as somewhere between 18,000 and 22,000 acres (Smith et al. 1976, Hunt 1993; DSC 2003).The least ambiguous description of the length along the shore of the dunes would seem to be from Point Sal north to Pismo Beach pier, a distance of 16.5 statute miles (G. Greenwald, pers. comm. 2006). This is the extent used by Hunt (1993) as the length of the Santa Maria Valley Dune Complex, of which the currently named GND are a major component. Other publications give the lateral extent of these dunes as up to 18 miles

The western boundary of the GND complex is here considered as the maximum high tide line, a departure from other studies of the fauna of the GND that includes references to the abundant marine life offshore of the dunes. Biota of the marine intertidal zone, both the sandy beach and rocky intertidal areas of Mussel Rock, are not here considered to be part the terrestrial GND system. For completeness of this report, however, a list of the known marine animals commonly associated (in the literature) with the GND are given in Appendix H

Some latitude was taken in the geographical extent of the dunes for the consideration of observations or collections of some species, primarily birds and invertebrates. For example, some species records simply state “Santa Maria”, “Pismo Beach” or “west of Guadalupe”. For the benefit of the doubt, these were included in the species list along with the source of the information so the records can be more easily re-examined at a later date if discrepancies seem likely.

1.5 Guadalupe-Nipomo Dune Habitat Descriptions

This section provides a general description of plant and animal communities that may occur in each habitat type of the GND. Habitats in the GND have been variously described in other publications. Classification of these habitats are generally similar but there are some differences. Habitat types presented here are relatively broad categories and are based on the Habitat Inventory and Ecological Database (HIED; Unocal 1999 – 2004). This document provides a more thorough description of each habitat type, including faunal associations.

Sandy Beach/ Dune Strand

The sandy beach and dune strand habitats are characterized by blowing sands with little plant diversity. These habitats are impacted by large waves and strong winds. On the inland side sandy beach/dune strand habitats merge into foredune habitats.

Plants that exist in sandy beach/dune strand areas can survive salt spray and being washed over by saltwater during storms. Common plants include iceplant (*Carpobrotus chilensis* and *C. edulis*), beach sand-verbena (*Abronia maritima*), and coastal saltbush (*Atriplex californica*).

Foredune

Inland of the dune strand habitat lie small dune formations called foredunes. Foredune habitats have many of the plants that occur in the dune strand in addition to other species. The shape and size of the foredunes change over time depending on winds, storms, and other physical factors (Entrix 1996). Strong winds and blowing sand occur in this area. These physical conditions provide harsh environments where few plants can grow. The most common plants are beach sand verbena, iceplant, beach bur (*Ambrosia chamissonis*), dune rush (*Juncus lesueurii*), dune morning glory (*Calystegia soldanella)*, and dune evening primrose (*Camissonia chieranthifolia).*

Dune Scrub

Dune scrub habitats have soil that is more fertile with a lower salt content than foredune habitats. This habitat supports a canopy of woody shrubs with an understory of herbaceous plants. Mock heather (*Ericameria ericoides*) is the most common shrub along with silver lupine, coastal buckwheat (*Eriogonum parvifolium*), coyote bush (*Baccharis pilularis*), croton (*Croton californicus*)*,* suffrutescent wallflower (*Erysimum insulare* var. *suffrutescens*)*,* and deerweed (*Lotus scoparius*)*.*

Herbaceous species may include purple sand-verbena (*Abronia umbellata*)*,* fiddleneck (*Amsinckia spectabilis*)*,* sand mat (*Cardionema ramosissima*)*,* Indian paintbrush (*Castilleja affinis*)*,* and owl's clover (*Castilleja exserta*).

Dune Swale/Dune Slack

Dune swales and dune slacks are habitats that have exposed water for part of the year. The water is usually deeper and stays longer in dune swales than dune slacks. Plants that may occur in these habitats include creeping rush (*Juncus lesueurii*), salt grass (*Distichlis spicata*), coyote bush, goldenrod (*Solidago spp*), and La Graciosa thistle (*Cirsium loncholepis*), a state-listed threatened and federally endangered species. Habitat association for this report combine both habitats into dune swale.

Wetlands

Wetlands are habitats with permanent or intermittent open water bodies. Species accounts for wetland habitats may include association with marshes, lakes, ponds, or springs. Wetlands may have a riparian component. Common to many wetlands is the tule (*Scirpus californicus*)*,* southwestern spiny rush (*Juncus acutus ssp. leopoldii*), and cattails (*Typha* spp.).

Riparian

Riparian habitats occur along the banks of rivers, streams, and sometimes wetlands. Riparian habitats can be diverse, including annual and perennial herbaceous species, shrub species, and commonly an overstory tree layer. Arroyo willow (*Salix lasiolepis*) is the most dominant tree/shrub in GND riparian habitats. In some of the drier riparian habitats, black cottonwood (*Populus balsamifera ssp. trichocarpa*) is found. Common shrub species are coyote bush, twinberry (*Lonicera involucrata*), blackberry, elderberry (*Sambucus mexicana*), and poison oak (*Toxicodendron diversilobum*). Common herbaceous plants are stinging nettle (*Urtica dioica* var. *holosericea*) and mugwort (*Artemisia douglasiana*).

Estuarine

Estuarine habitats occur where salt water mixes with freshwater runoff. Estuaries usually have open water with tidal flats that may be cut off from the ocean for part of the year. Estuarine plants in the GND include salt grass, coastal silver leaf, and pickleweed (*Salcornia spp*.).

Marine

Marine habitats include intertidal (periodically under saltwater) areas and subtidal (continually under saltwater). The intertidal area of the GND is almost completely sandy beach but there are rocky intertidal areas at Mussel Rock and at Point Sal. Total area of the GND intertidal area is not known but is wider at the northern end where the beach gradient is low and narrower at the southern end where the beach gradient is much steeper. Except for a few bird species, no species habitat associations were condiderded for this report in marine habitats (but see Appendix H for a list of known marine faunal species commonly associated with the GND).

1.6 Sources

This report is based on the known GND fieldwork and studies in the literature. Generally, this literature consists not of research from throughout the dunes as a whole, but rather as more of a disparate collection of independent studies on certain aspects of dune biology in specific, limited areas of the GND. Upon collection and examination of the literature, it became clear that there were three general problems that needed some clarification.

First, in some reports, but notably Smith et al. 1976, uncertainty existed as to whether a species was actually identified in the field or from collections or was included in the reports' species list because it was "likely" to occur because the GND was within its' published geographical range. In these cases, if a species was not clearly reported as present in a later study, its presence was considered unconfirmed.

Second, changes in taxonomic classifications, particularly in name changes at the species and subspecies level, created ambiguities as to what taxon was present. Although this occurred throughout the faunal groups, it was particularly applicable to reptiles. Rectification of ambiguities was of more concern for those species considered to be of special status. In a few cases, species identified in earlier studies were later split into subspecies with special status. Whether these subspecies were the ones identified in the earlier study is unknown. Those species selected as of special interest address this issue as it applies. The genus and species are given as presented in the reports cited; no attempt was made to update their taxonomy.

Third, much of the information necessary to directly answer the above listed questions does not exist. This includes information on basic biology (e.g., habitat requirements, plant associations, breeding, seasonality) as well as for general environmental concerns such as susceptibility to herbicides. Where specific information is lacking, responses may involve speculation, identified as such, based on information from other, related taxa.

1.7 Criteria for special-status species

There are three primary criteria for selection of special-status species. First is official recognition by federal or State of California agencies. For the state, this can include appearing in the list of “element occurrences” in the RareFind 3.1 database maintained by the California Natural Diversity Data Base (CNDDB), an office in the Department of Fish and Game; or occurrence in a separate list of “species of special concern” maintained by the Department of Fish and Game. For federal agencies, this may include the U.S. Forest Service, Bureau of Land Management and one or more district offices of the U.S. Fish and Wildlife Service. Species of special interest to government agencies that may occur in the GND but whose presence is not currently confirmed are also discussed.

The second category is recognition by a special interest group such as the Audubon Society for birds or the Xerces Society for invertebrates. The third category, somewhat subjective, are species of local interest. This category includes species known or suspected of having a very limited range, of being dune obligate species, species where the holotype specimens were collected in the GND and some of the larger carnivorous mammals of general interest to the public.

1.8 Annotated Primary Literature Sources

Six GND wildlife studies conducted over the past 30 years provide much information and are considered here to be the core studies for wildlife in the GND:

- Smith et al. 1976
- Dames & Moore 1979
- Burton and Kutilek 1991
- Kutilek, Shellhammer, and Bros 1991
- Entrix Inc. 1996

- Unocal 1999-2004

However, many other publications provided pertinent information specific to GND wildlife and habitats. The more important of these publications are briefly annotated below along with the core studies.

Smith, K. A., J. W. Speth, and B. Browning. 1976. The Natural Resources of the Nipomo Dunes and Wetlands. U.S. Fish and Wildlife Service Coastal Wetlands Series #15. June, 1976. 106 pp., plus appendices. Listed in Tables of Wildlife Occurrences as **Reference 1**.

This report documented the natural resources of an 18-square mile section of coast in southern San Luis Obispo and northern Santa Barbara Counties. This is the only known report to cover the entire GND complex. One significant shortcoming is that there is no mention on how they generated species lists, therefore, there is no way of knowing if the species mentioned were observed or just suspected to occur. Many species reported by Smith et al. have not been observed by subsequent researchers. Therefore, where this is the only reference for a species, designated in the species list by the number “1”, the observation may or may not reflect a direct observation of that species.

Dames and Moore. 1979. Biological investigations Guadalupe Oil Field. LeRoy Lease operations expansion. San Luis Obispo County, California. Prepared for Union Oil Co. California. Nov. 7, 1979. Listed in Tables of Wildlife Occurrences as **Reference 10**.

A list of the terrestrial animals expected to be associated with the LeRoy Lease area. The study included an extensive literature review and results of eight days of field verification between August 1977 and December 1979.

Burton, R., and M. Kutilek. 1991. Inventory of birds, amphibians and reptiles at Oso Flaco Lake, Pismo Dunes State Vehicular Recreation Area, California. Prepared for Calif. Dept. Parks Rec., Off-Highway Motor Vehicle Recreation Division, August 1991. Listed in Tables of Wildlife Occurrences as **Reference 11**.

Kutilek, M., H. Shellhammer, and W. Bros. 1991. Inventory, wildlife habitat protection program and monitoring program for Pismo Dunes State Vehicular Recreation Area, California. Prepared for Calif. Dept. Parks Rec., Off-Highway Motor Vehicle Recreation Division, January 1991. Listed in Tables of Wildlife Occurrences as **Reference 12**.

Survey methods were described and they presented density estimates of amphibians, reptiles, birds, and mammals. One limit of these studies, however, is that they were carried out on finite areas within the GND, near

Oso Flaco Lake for Burton and Kutilek (1991) and the Oceano Dunes State Recreational Vehicle Area for Kutilek et al. (1991). The extent to which they are representative of all the habitats in the GND is not known.

Entrix, Inc. 1996. Preliminary assessment of habitats and biological resources at the Guadalupe Oil Field site. Prepared for Unocal, Orcutt CA. Feb. 28, 1996. Listed in Tables of Wildlife Occurrences as **Reference 6**.

The Entrix Inc. (1996) study defined the various habitat types and identified the flora and fauna known or likely to occur. Primarily a field study but literature sources filled in some gaps. The report escribed 17 habitat types, methods and species lists for amphibian, reptiles, mammals, birds, fish, and invertebrates.

Unocal. 1999-2004. Guadalupe Oil Field (GOF) Restoration Project. Quarterly Environmental Monitoring Reports (QEMRs). Listed in Tables of Wildlife Occurrences as **Reference 9**.

The quarterly summaries cover the period from January 2000 through September 2004. The Unocal website says the reports are available for public review at Unocal's Guadalupe Field office, but we received them from outside sources. The reports available to us provided a considerable source of recent information on occurrences of wildlife taxa and associated habitats on the GOF.

<u>Bats</u>

Pierson, E., P. Collins, W. Rainey, P. Heady, and C. Corben. 2002. Distribution, Status and Habitat Associations of Bat Species on Vandenberg Air Force Base, Santa Barbara County, California. Santa Barbara Museum of Natural History Technical Reports – No. 1. Listed in Tables of Wildlife Occurrences as **Reference D11.**

No surveys specific to bat species have been done in the GND. However, this report is the result of a focused survey of bats on VAFB. This area lies within a few miles of the southern end of the GND and contains similar habitats and therefore many of the bat species listed in this report may be expected to occur at the GND. Paul Collins, Curator, Santa Barbara Museum of Natural History, provided a list of the species of bats he would expect to find in the GND based on his findings of bats in similar habitats at VAFB.

<u>Birds</u>

Marantz, Curtis. 1986. The Birds of San Luis Obispo County, California: Their Status and Distribution. MS Thesis CalPoly San Luis Obispo. Available on microfiche from library archives. Listed in Tables of Wildlife Occurrences as **Reference D99**.

This document is a biogeographic account of birds occurring in San Luis Obispo County based mainly on observations of Audubon Society birders. The author divided the County into four districts (Coast, Interior, Carrizo and Elkhorn Plains, and Cuyama Valley) each drawn to encompass separate plant communities

Lehman, P.E. 1994. The Birds of Santa Barbara County, California. UCSB Vertebrate Museum. 337 pp. Listed in Tables of Wildlife Occurrences as **Reference D55**.

Lehman's efforts are similar to that of Marantz, in that he divided vetted records of birds from Santa Barbara County into various vegetative communities. From these accounts we selected those that occurred at the Santa Maria river mouth or Pt. Sal.

<u>Invertebrates</u>

Powell, J. A. 1976. A remarkable new genus of brachypterous moth from coastal sand dunes in California (Lepidoptera: Gelechiodea, Scythrididae). Ann. Entomol Soc. 69(2):325-339. Listed in Tables of Wildlife Occurrences as **Reference 17**.

-----------. 1981. Endangered habitats for insects: California coastal sand dunes. Atala 6 (1-2):41-55. Listed in Tables of Wildlife Occurrences as **Reference 13**.

-----------. 1991. A review of Lithariapteryx (Heliodinidae) with description of an elegant new species from coastal sand dunes in California. J. Lepidop. Soc. 45(2):89-104. Listed in Tables of Wildlife Occurrences as **Reference 16**.

Powell, J.A. and D. Povolny. 2001. Gnorimoschemine moths of coastal dune and scrub habitats in California (Lepidoptera: Gelechiidae). Holarctic Lepidoptera, 8 (Suppl. 1):1-51. Listed in Tables of Wildlife Occurrences as **Reference 14**.

Dr. Jerry Powell, professor of entomology, Emeritus, University of California Berkeley, has a long-standing involvement with the California Insect Survey. His specialty is moths, but he is a consummate entomologist with a vast knowledge of the insect fauna of the GND. Powell (1976) is the original description of the Oso Flaco flightless moth, a GND endemic species. Powell 1991 describes another new species of unusual moth first collected in the GND but known from a few other sites. The second publication lists several taxa of coastal dune endemics and several that may be endemic to the GND. The last publication describes several new moth taxa first collected in the GND. In addition, he is co-author of California Insects (Powell and Hogue 1979), many entries of which also reflect his vast knowledge and understanding of insects in coastal dune ecosystems.

Sheridan, D. 1994. Arthropods of the Nipomo Dunes and San Antonio Terrace, San Luis Obispo and Santa Barbara Counties, California. Final report to The Nature Conservancy. October 1994. Listed in Tables of Wildlife Occurrences as **Reference 23**.

Useful study of insects in the GND and at Vandenberg AFB. However, a significant problem with this report is that there was no separation of taxa collected at VAFB from those collected at GND habitats. Therefore, the records of insects from this report must be considered essentially anecdotal for the GND. A CalPoly, SLO, intern during these surveys prepared a report with useful entomological information (Smyer 1991).

Emmel, T., and J. Emmel. 1973. The butterflies of Southern California. Natural History Museum of Los Angeles County. Los Angeles. 148 pp. Listed in Tables of Wildlife Occurrences as **Reference 30**.

The taxonomy of butterflies continually changes especially regarding genus and subspecies designations. However, the natural history, ranges, plant associations, drawings of caterpillars and photographs of adult butterflies of the described species remain relevant and timely. The range covered in the publication includes San Luis Obispo County.

Bulletin of the California Insect Survey. Vols. 1-27. Berkeley and Los Angeles: University of California Press. Listed in Tables of Wildlife Occurrences as **References 31 to 47**.

Ongoing synopses of identification, distribution, and biology of selected taxonomic groups. Volumes 1 to 27 are available electronically at www. Essig.berkeley.edu-California Insect Survey-Essig Museum of Entomology. Reported ranges of many groups of insects in these bulletins include references to areas within the GND, including Oso Flaco Lake, Dune Lakes, and Santa Maria Dunes. In most of the bulletins, occurrences are identified by specific locations but several bulletins have occurrence locations indicated by a symbol on a small scale map of California; location of some of these symbols within the GND are fairly obvious but in several instances, some interpretation was necessary to place the taxa in the GND.

Entrix, Inc. 1995. Special status invertebrates potentially occurring in the Guadalupe remediation project site. Prepared for Unocal, Orcutt CA. June 2, 1995.

Pertinent information about the distribution, natural history, and known habitat requirements for various special status insects and invertebrates that have some potential to occur near the beach and near-shore dune habitats. Much of the information came from a proprietary data base (BUGGY database).

Slobodchikoff, C., and J. Doyen. 1977. Effects of *Ammophila arenaria* on sand dune arthropod communities. Ecology 58:1171-1175.

This study documented the reduction in arthropod numbers and species richness in areas of dense stands of European beach grass using an area in the GND as a test plot. Verifies the presence of the dune beetle *Coelus ciliatus* in the GND.

Roth, B. 2004. Guadalupe-Nipomo dunes snails and related questions. Report prepared for inclusion in present report.

Report prepared by Dr. B. Roth, California Academy of Science and acknowledged authority on California land snails, at the request of J. Blecha to determine what snails are present in the GND and, specifically, whether the Morro shoulderband snail, a Federally endangered species, was ever collected in any GND habitats

2.0 CONTROL OF INVASIVE PLANTS

Control of invasive plant species has long been recognized as a top priority for the GND (Smith et al. 1976; Schmaltzer and Hinkle 1987) and is currently recognized by all land managers in the GND as a primary goal. The possible impacts of weed control methods on sensitive wildlife species in the GND is dependent upon the species and control methods. Techniques used in the GND are presented in detail in various reports (Land Conservancy 2003; Chesnut 1999).

2.1 Background

Various control methods have been employed by various resource managers in the dunes including burning, herbicides, grazing, and manual and mechanical removal. The Land Conservancy of San Luis Obispo (LCSLO) assumed a lead role in this process within the GND in 1999. LCSLO has experimented with many control techniques for the various target species and evaluated their effectiveness and efficiency to select the best control methods for each species (Chesnut 1999; Land Conservancy 2003; Cleveland 2003). At the former Guadalupe Oil Field, now referred to as the Guadalupe Remediation Site, or GRS, an extensive program of invasive weed control is undertaken by private contractors; the scope of this project in terms of area of land treated annually may equal or exceed that of the other areas of the GND combined (G. Greenwald, pers. comm. 2006).

The following sections explain current weed control methods and applications used by the LCSLO. In general, these methods are similar to the methods used by other weed abatement contractors working in the dunes under contract to the various land managers. Presumably, the methods and techniques used in the GND for weed control as outlined here will be modified and changed over time, as has been the case, to reflect new products, methods, procedures, and most importantly, effectiveness and knowledge gained.

2.2 Invasive Plant Species

The five primary invasive plant species selected by the DC for removal from the GND are: veldt grass (*Ehrharta calycina*), beach grass (*Ammophila arenaria*), pampas grass (*Cortaderia jubata*), ice plant (*Carpobrotus edulis* and *C. chilensis*) and slender-leaved ice plant (*Conicosia pugioniformis*) (Land Conservancy 2003). These taxa have been and are currently the primary target for control throughout the dunes due to their ubiquity and their high potential to replace native dune vegetation, alter dune habitats, and profoundly change the geomorphology of the dunes (Schmaltzer and Hinkle 1987; Hunt 1993; Land Conservancy 2003).

Chesnut (1999) lists several other species that have been variously controlled in the GND by collaborative members (including Unocal): blue gum eucalyptus (*Eucalyptus globulus*) (see also Land Conservancy 1992); giant reed (*Arundo donax*); fennel

(*Foeniculum vulgare*); Cape ivy (*Senecio mikanioides*); hoary cress (*Cardaria draba*); poison hemlock (*Conium maculatum*); red (foxtail) brome (*Bromus madritensis* ssp. *ruben*s); purple ragwort (*Senecio elegans*); Sydney golden wattle (*Acacia longifolia*); Harding grass (*Phalaris aquatica*); rabbitfoot grass (*Polypogon monospeliensis*); Kikuyu grass (*Pennistetum clandestinum*); bull thistle (*Cirsium vulgare*); Italian (slender) thistle (*Carduus pycnocephalus*); and yellow star-thistle (*Centaurea melitensis*). These species fall into one of three categories: 1) fairly limited in their distribution in the GND; 2) have been largely controlled; or 3) not currently within GND but common on adjacent agricultural land.

2.3 Current Methods

The most important aspect of the control methods used for invasive species in the GND, from a wildlife perspective, is that they are highly specific for individual plants of the target species. Of the methods commonly used, grazing and burning are the least selective in terms of affecting only the target species; while small scale (i.e. hand clearing) mechanical removal and hand application of herbicides are the most selective. Herbicides are the most widely used control method and are commonly used in conjunction with mechanical removal.

<u>Herbicides</u>

Of primary concern, besides controlling the invasive species, is to not harm native plants which may be near the target species. Herbicides can accomplish this in two ways: 1) application of the herbicide specifically and only to the target species, and 2) selection of herbicide(s) that control certan types of plants (e.g., monocots).

<u>Application</u>

Within the GND, normal application methods are to have individual applicators apply the herbicide to individual plants of the target species. In the majority of the GND system, road access is limited and applicators generally use backpack sprayers and gain access by foot. In the former Guadalupe oil field, which has an elaborate road system, applicators commonly use hoses attached to a truck mounted supply.

Although applicators use special methods (treatments), developed over time and based on their overall effectiveness, for each of the five main target species, there are similarities among all treatments and all applicators:

- Applicators must be familiar with the target species in its various habitats and growth stages;
- Similarly, applicators must be familiar with native vegetation, including most if not all of the sensitive floral species, in their various growth stages, growth forms, and habitats;

- Prior to treatments in specific areas, workers identify and mark individual plants of sensitive species;

- Sensitive plants are protected from herbicides by shields or by hand removal of weed species within an 18 in. radius of the sensitive plant;

- Herbicides are applied only in terrestrial habitats where there is a very low chance of it getting into dune swales or other wetland habitats;

- Equipment is maintained in good condition and detailed procedures followed to preclude accidental release of herbicide (e.g., dripping nozzles, accidental spills, slop while filling sprayers or while mixing ingredients);

- Various weather conditions (wind, fog, rain, temperature) that may increase likelihood of overspray or otherwise decrease the effectiveness of herbicides will halt application.

To increase effectiveness of the herbicides, in some cases, for example veldt and pampas (jubata) grasses, the plants may be first cut down to reduce surface area and herbicide applied sometime thereafter to the new growth. Timing is important as the effectiveness of most methods is increased if the target species can be cut and or sprayed before going to seed.

Although the methods currently used for herbicide application are very specific to the target species and therefore relatively labor intensive, at some time in the future the prevailing weed control paradigm among GND resource managers may change to include broad scale herbicide applications, such as by aerial spraying over large areas.

<u>Herbicides used</u>

In addition to the specific application methods, the type of herbicides used is an important factor relevant to potential wildlife impacts. Herbicides used in the GND are of two types based on their active ingredient;

- glyphosate based herbicides such as Roundup ® Aquamaster®, and Honcho® and;

- fluazifop-p-butyl based herbicide Fusilade® .

Roundup® (used here as a generic classification for glyphosate based herbicides) is a non-selective, systemic herbicide that kills most annual and perennial plants while Fusilade® kills annual and perennial grasses (herbaceous plants, monocotyledons or monocots) but does little or no harm to broad-leafed plants (woody plants, dicotelydons or dicots) (Tu et al. 2001). Both of these herbicides, but especially Roundup®, are in wide use by both conservation organizations (Burn et al. 2003) and some federal agencies (e.g., U.S. Forest Service) because they break down relatively quickly, do not bioaccumulate and are relatively non-toxic to wildlife (McNabb 1997; Tu et al. 2001; Burn et al. 2003). In normal use, Roundup® should not be toxic to wildlife if intercepted by the targeted vegetation due to its rapid breakdown and dissipation (NRA 1996; Burn et al. 2003).

Most of the reported problems regarding the deleterious effects of herbicides (e.g. Relyea 2005; Smith 2001), but Roundup® in particular due to its widespread use based on its reputed relatively benign effects to fauna, on the fauna of treated areas relate to four areas; 1) their application is non-specific for target species, usually applied by aerial spraying; 2) they drift onto and kill non-target species (native vegetation); 3) they are inadvertently applied to wetland areas, especially shallow, maybe ephemeral, wetlands where many chemically sensitive animals such as amphibians breed and; 4) a concern that, nation- and world-wide, herbicides are applied too much into the environment and could be detrimental to non-target flora and fauna based on this ubiquitous and voluminous universal use. The concerns raised in the first three points are negligible or significantly reduced in the GND by the target-species specific application methods used in the GND (Burn et al. 2003). The fourth concern is universal and of concern in the GND due to pesticide and herbicide drift from adjacent agricultural operations.

Both herbicide types are mixed in various concentrations and mixed with various additives to increase their effectiveness. These formulations, developed by the GND applicators (LCSLO and other contractors) over time, are based on several variables including target species, growth stage (new growth or old), and area of dunes to be treated (e.g., steep slope, flat slope, dense growth). Additives include crop oil, used as a penetrant to dissolve the waxy surface of leaves, a surfactant to fix the herbicide to the leaves, and a dye to mark plants treated. A complete listing of the formulations used, application methods, and criteria are presented in Land Conservancy (2003).

Beach grass and veldt grass are the most serious invasive species threat to the dunes ecosystems because of their high potential to degrade large areas of the natural ecosystems and to change the geomorphology of the dune system (Hunt 1993; Chesnut 1999). Together these two grasses infest approximately 2,000 acres of dunes (Chesnut 1999) and their control constitutes an estimated 80 percent or better of the total field effort for invasive weed control in the GND by the Land Conservancy (J. Blecha, C. Cleveland, pers. obs, 2003-2004). Past and present control measures for these invasive grasses include, in addition to herbicide application, burning, grazing, and small-scale mechanical removal. However, herbicide application remains the most effective control method beach and veldt grass (M. Skinner, pers. comm., 2004). Fusilade® is the preferred treatment of these grasses due to its specificity for monocots and its effectiveness on them. Overspray with Fusilade® becomes a problem only when native grasses are nearby and then extreme caution is exercised to avoid their damage. Glyphosate products are used to control beach grass and veldt grasses within GND federal lands, and throughout the GND on ice plant species and around wetlands. Because glyphosate products are effective against both monocots and dicots, they represent is a higher risk to non-target plant species.

Mechanical removal

Mechanical removal is generally combined with herbicide applications and, similar to herbicide application, done by hand and fairly specific to the target species. Methods for removal depend on the target species. *Eucalyptus* are sawn down, logged out, and stumps sprayed with herbicide. Pampas grass is cut by shovel or saw and sprayed with herbicide. Veldt grass in large dense stands is cut with weed wackers to a height of 2 in. and sprayed with herbicide.

At some time in the future, a viable alternative to hand removal may be a large scale mechanical removal of large stands of pure target species, probably beach grass or veldt grass, using bulldozers or tractors.

Grazing

Historically, areas of GND have been extensively grazed by cattle primarily but also sheep and goats (Smith et al. 1976). These historical uses were not intended to control invasive weeds and in fact veldt grass may have been planted in the dunes in the 1940’s as forage for cattle (LCSLO poster). In experiments designed to shed light on the potential for cattle grazing to control veldt grass, the “collateral” damage to non-target species, particularly *Dudleya* spp. was considered unacceptable (Chesnut 1999). However, grazing under certain conditions is still a viable option for weed control and may be a useful tool under controlled conditions in certain areas of the GND.

Burning

Burning areas of dense stands of exotic species is a major tool in the land managers’ tool box (D’Antonio et al. 1993). Fires burn both target and native vegetation however and it is only by judicious application of the burn that its effects can be restricted to the target invasive species. Controlled burns in the GND have been and are generally restricted to relatively pure stands of beach grass although dense stands of veldt grass may have also been burned.

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3.0 INVERTEBRATES

3.1 Findings

By any measure, numbers of individuals, total biomass, or the diversity of species (species richness), invertebrates are the dominant macroscopic fauna of our planet. All but one of the 33 or 34 phyla of animals are invertebrates. Of these, one phylum, Arthropoda, is by far the most successful in terms of number of species, number of individuals and biomass of all the others together. Within the Arthorpoda are the highly successful classes Crustacea and Insecta (Arnett 2000).

Viewed in these terms, the vast majority of the fauna of the GND would be expected to consist of invertebrates, primarily insects. However, this is not quite the situation in the literature; invertebrates are vastly underrepresented in the observed fauna of the GND. Approximately 725 faunal taxa are verified as occurring in the GND (Appendix E) of which approximately 330, or 45%, are invertebrates (Appendix A). Of the invertebrates in the GND, insects comprise roughly 90% of all invertebrate taxa with beetles, butterflies and flies accounting for over 90% of the insect taxa.

The number of invertebrate taxa verified from existing reports of collections or records in the GND, taken at face value, would seem to indicate a very depauperate invertebrate fauna, especially for the insects. For example, by comparison, over a four year period, an entomologist in Maryland collected over one half million insects identified to approximately 4,000 species from his back yard and an entomologist in Connecticut found more than 1,000 lepidopteran species, mostly moths, at his residence (Dawson 2004). Closer to home, within the Coal Oil Point Reserve in Santa Barbara Co., a coastal dune system of approximately 200 acres, 567 taxa of insects have been identified (www.sbnature.org).

A more plausible explanation for the seemingly poor invertebrate fauna, however, is not that it is poor but that it has not been documented by systematic collections. The high species richness in the above “backyard” studies are the result of relatively intense, regular (or constant) collections in a small area over multiple years. In the GND, however, invertebrate collections were generally sporadic or opportunistic collections in limited areas and during limited times. With systematic invertebrate, primarily insect, collections in the GND over a wide variety of the habitats and with appropriate spatial and temporal separation, the number of insects identified could be expected to vastly increase, perhaps into the thousands, as was suggested by Bill Denneen (2004). Systematic collections by experts in certain orders of insects (beetles, or even certain families of beetles, butterflies, true flies, and crickets for example) within the GND may turn up more endemic species, as was the case with Powell and Povolny (2001) who described two species of moth collected in the dunes that have not been found elsewhere to date.

A further explanation for the general lack of information on invertebrate fauna in the GND is that in some cases systematic studies were done and even though fairly limited in scope, the results were not published. As example, Powell (1981) states that he collected over 110 species of microlepidopterans (generally small moths) from the “Santa Maria dunes” but, other than publication of descriptions of several new species, including the Oso Flaco flightless moth (Powell 1976), identification of these species were not published. In other cases, as for example the therevid flies and bees, spot surveys were conducted opportunistically on one or two days by experts passing through and the results documented in a letter sent to a dunes resource manager. Other opportunistic surveys of this nature may have been completed by experts but for which no record exists. Some insect studies were done as student projects either locally or at colleges at some distance from the dunes; results of these studies are often difficult to obtain.

Endemic invertebrates

It is generally true that the larger the animal the larger the area it needs to sustain life. Although some of the vertebrate species identified in the GND are relatively small animals with relatively limited distribution and limited dispersal capabilities (except birds), there are no vertebrates known to be endemic to the 22,000 acres of the GND. However, five species of invertebrate, all insects, have been first collected and described (holotypes) from GND habitats and since to date they have not been collected outside of the GND, they may be considered GND endemic species. These species include: three moth species (*Gnorimoschema baccharisselloides*, *G. ericoides* and *Areniscythris brachypteris* -the Oso Flaco flightless moth), one robber fly (*Ablautus schlingeri*), and one scarab beetle, *Lichnanthe albipilosa*. Additionally, one butterfly subspecies, the Oso Flaco patch butterfly (*Chlosyne leanira osoflaco* or *Thessalia leanira elegans*) is known only from the GND.

Considering the large size and relatively undisturbed nature of large tracts within the GND, it seems likely that systematic investigation of the GND by specialists will turn up more endemic species. For example, the existing, highly disturbed (but under restoration) El Segundo dune system in Los Angeles Co. covers approximately 40 acres, the remainder of a formerly 3000 acre dune system (Mattoni, Longicore, and Novotny 2000). In this system, besides the federally endangered El Segundo blue butterfly, are nine other endemic species: four moths, three weevils (beetles), one spider, and one cricket (Mattoni, Longicore, and Novotny 2000). We must also consider that systematic investigations of other coastal dune systems may turn up some species now considered endemic to the GND to be rather more widespread.

3.2 Potential Effects Of Invasive Plant Control Methods

Even though it is probable that the majority of invertebrate species (mostly insects) present in the GND, including some that may be endemics or with a very limited distribution, are undocumented, the general and specific information on the invertebrate fauna known to exist allows some generalizations to be made regarding the potential threat to this fauna from invasive weed control. An appropriate summary statement of the effects of weed control measures on dune insects is that by Dr. P. da Silva, College of Marin working with insect pollinators at Point Reyes National Seashore:

> "However, the general idea I have is that anything that will increase the diversity of native plant species will also increase the diversity of native insects, as long as recolonization can occur from a nearby source. And if you are not affecting large areas with herbicides or fire at one time, the sources should remain intact" (da Silva, pers. comm. 2005).

While native insects prefer native vegetation (Kremen et al. 2002; Powell 2002; Rubinoff 2002), they may be associated with invasive weeds, either as a food source or for shelter. For example, many insects including bees, wasps, flies, butterflies, and beetles use iceplant flowers as a nectar source (Shapiro 2002**),** and orb spiders use veldt and beach grass leaves and stems for web supports. Bumble bees use introduced plants, including some fairly obnoxious invasive weeds such as yellow star thistle (not present in the GND), as pollen and nectar resources (Thorp et al. 2002). Many butterfly species are documented as using exotic plants and populations of some butterflies may have increased in certain areas due to an increase in abundance of an exotic plant species fed on by the caterpillar (Connor et al. 2002). In addition, hunting spiders may be fairly common in the sand among the living or dead stems of beach grass. Some insects, such as butterflies, grasshoppers, flies, and beetles may use the invasive species for resting places. Even the introduced Eucalyptus has an associated native insect fauna, including the well known monarch butterflies.

Mortality of insects, associated either actively or passively with target weeds, may be caused directly from the herbicide, as might be the case with direct application to smaller, soft-bodied insects (ants, flies, butterflies). In some cases, an insect may be incapacitated by the herbicide and eventually captured by an invertebrate or vertebrate predator. This type of mortality may be increased when a penetrant such as crop oil is added causing a reduction in the animals mobility (wetted and/or gummed wings or legs). The effects of herbicide application on robust, hard-shelled forms such as many of the beetles, burrowing insects, including many beetle larvae and adults, fly larvae, and some caterpillars, that may be near the target weed species are unknown but are probably less than for soft skinned animals exposed directly to the spray. Secondary or indirect effects to the insect community, in terms of abundance and species richness, are generally ascribed to a change in the plant community structure and composition rather than to the a lethal effect of the herbicide on the animals such as might occur through ingestion of a treated plant (Freemark and Boutin 1995; Burn et al. 2003).

Recent studies on Roundup© indicate that toxicity to aquatic species including amphibians and insects, appears to be caused not by the active ingredient (glyphosate) but the manufacturer added surfactant (Relyea 2005). However, drenching eggs of the

Karner blue butterfly (*Lycaeides melissa*) with operational concentrations of glyphosate herbicide did not adversely affect the hatching of the eggs (Sucoff et al. 2001).

Mechanical removal as currently practiced in the GND is generally performed using hand tools and is probably of fairly low impact to the associated invertebrate fauna. However, large scale removal projects with bulldozers and burning, for example, can be expected to cause high mortality with all insect fauna associated with the target species. Besides mortality of invertebrates directly associated with the target species, areas immediately adjacent to the site can be expected to be impacted by the equipment activity (fire trucks, crew trucks, observer vehicles, turn around areas for bulldozers, areas scraped of sand to build up dunes after invasive removal, etc.). Depending on the location of the large scale control methods, there could be some impact on sensitive species. For example, if a large scale removal of beach grass occurred on the foredunes, the associated activity could impact globose dune beetles or tiger beetles. Further inland, associated activity near the site may impact the Oso Flaco flightless moth, known to occur in bare sand areas near vegetated slopes (Powell 1981).

Our review of available information indicated that no federal or state sensitive invertebrate species are associated directly with the invasive grass species. One exception is the Morro shoulderband snail, which does not occur in the GND, that has been found with iceplant and European beach grass (see species account below). The association between monarch butterflies and eucalyptus trees for fall resting and winter roosting sites is well known. However, prior to any type of large scale control activity, a study of the associated insect fauna associated would provide an estimate of the impact risk to the populations associated with the target plants. For the most accurate picture of this fauna, surveys would need to occur on regular, e.g., monthly, intervals for at least one year. If large scale control measures are deemed necessary, and pre-treatment surveys are not possible, it is probable that any sensitive invertebrate species that might be negatively affected would be small compared to their potential total population in unaffected areas and that individuals from these areas would over time repopulate the affected area.

For the GND invertebrates considered to be special-status species, aspects of their known ecology, natural history, and how they might be impacted by current invasive weed control methods are presented in individual species accounts below.

3.3 Summary of Invertebrate Groups

A general summary of the ecology, relevant to current weed control methods, for selected invertebrate groups present in the GND is presented below.

<u>Mollusks</u>

Of the seven taxa of terrestrial snails known to occur in the GND, none are considered to be of special interest because they have a relatively wide geographical distribution.

Other than the common brown garden snail, *Helix*, none of the snails are exotics or considered to be a threat to the native snails. An example of the latter is the decollate snail (*Rumina decollata*), an exotic snail that preys on native snails in other parts of the state but not recorded from the GND.

Potential effects of invasive plant species control methods

The two species of *Helminthoglypta* known to be in the dunes may use European beach grass and ice plant as shelter, as is known for the related Morro shoulderband (which is not documented from the GND), and the control of these weed species may have some impact on these snails. The degree of this impact is unknown but not expected to seriously affect their populations in the GND based on the findings for the Morro shoulderband that, while they have been found in these invasive plant species, their incidence is low compared to that in the native vegetation (Walgren 2001). Also, these snails eat only dead vegetation, unlike the common garden snails that prefer live plant material, and presumably the herbicide would be degredated to harmless compounds within the plants cells by the time the plant material would be potentially palatable to these snails.

Arachnids

Arachnids present in the GND include spiders, harvestmen, ticks and scorpions. Of these only ticks have been specifically surveyed for in the GND. Harvestmen (daddy longlegs) and scorpions are known to occur in the GND, perhaps a few to several species of each, but the taxa have not been documented in the printed literature.

Spiders, the more ecologically important members of the arachnids, are similarly underrepresented in the observed dune fauna. Their sole reference only noted that members of this class of invertebrates occurs in the GND (Sheridan 1994). It is unknown how many arachnid taxa occur in the GND but it is probable that a focused arachnid survey of the dune habitats would identify a few to several dozen species, including one or two that are sand dune obligate species (see below). For example, a survey of spiders in an 80 acre Christmas tree farm in San Bernardino Co., California identified 24 spider taxa (Ali and Hartin 1988).

All spiders are predators and generally capture only live animals (Kaston 1953). Some are more or less stationary and build webs or tunnels lined with silk. Others actively hunt and do not construct permanent structures to capture prey. Prey ranges from an occasional vertebrate such as a mouse, snake or fish (small minnows) for some larger species, but ordinarily they feed on insects or other spiders. They are generally not selective as to what insects are taken but will capture, kill and feed on whatever happens to come their way (Kaston 1953). Not all insects are taken in equally by spiders, however. For example, the abundant orb web spiders are known to very effectively capture dipterans but adult moths and butterflies are notorious in being able to slip through spider webs probably as a result of their detachable scales (Eisner et al. 1964). Spiders can be very abundant in some circumstances, and may play an important role in stabilizing or regulating insect populations because they are one of the most numerous insectivores and exhibit a wide variety of lifestyles and foraging strategies (Wise 1993). They are important prey for a wide variety of birds (Sibley et al. 2001), lizards, snakes and small mammals. Additionally, spider silk may play an important ecological role among some animals; nearly all species of hummingbirds, for example, depend on silk from spiders and caterpillars for nest construction (Hansell 1993).

Spider species may have a wide distribution or remain relatively local. Widely distributed species disperse by “ballooning” where spiderlets emit a short length of silk, let the wind catch them and essentially fly off to new areas, sometimes 100’s of miles distant. Other spiders, particularly the ground dwelling, tube building taxa such as trapdoor spiders, have a fairly limited dispersal mechanism consisting of primarily of a male searching for a mate within a distance of several meters to perhaps 2 km or so (Bond et al. 2001).

Several spider taxa are endemics to coastal dunes in California world (Bond et al. 2001; Ramirez 1995) and spider endemics are known from other coastal dune systems around the world (Griffiths 2002). *Apostichus* spp., one of two California trapdoor spiders that are coastal dune endemics, was recently collected and identified from the USFWS Guadalupe-Nipomo Dunes Wildlife Refuge (G. Greenwald, pers. comm. 2006). The 40 acre El Segundo dunes has one endemic crab spider, *Ebo* new species (Mattoni, Longicore, and Novotny 2000). In New Zealand, the katipo (*Latrodectus katipo* and *L. atritus*), congeners of our black widow (*Latrodectus mactans*), are known only from coastal dune systems. Katipo require open sand to build their webs over, are rarely recorded from habitats other than coastal dunes; aggressive introduced plants that cover dune systems in dense foliage, create an environment unsuitable for their webs and threaten their long-term survival (Griffith 2002).

Potential effects of invasive plant species control methods

Many if not most spiders are not associated with a particular plant species although they may be associated with a particular habitat that is dominated or defined by a particular plant species (Wise 1993). Rather, spiders are associated with a particular vegetation structure irrespective of plant species. Therefore it is not uncommon for spiders to be associated with and fairly abundant among alien plant species (Nyffeler et al. 1994). Casual observations of living and dead patches of European beach grass in the GND seem to confirm that spiders may be very common there.

Direct application of herbicide to orb-web spiders can be expected to cause mortality. During certain times of the year the target weed species may be literally covered with ballooning spiderlets which will be killed outright by the herbicide due to their small size and soft integument. Direct effects of the herbicides are exacerbated by addition of crop oil as a surfactant to the herbicide. Some herbicide caused mortality can be expected to occur among the ground dwelling spiders that may be relatively abundant near the sand surface under the thatch of beach grass. This mortality can be expected to be less, perhaps much less, than for orb web spiders. Trapdoor and other burrowing spiders are not expected to be affected by current herbicide application methods in the GND.

A recent study of the effects of glyphosate herbicides on spider communities found that the spider species were never eliminated from a treated habitat but instead were significantly reduced (Bell et al. 2002). However, this reduction did not cause the composition of the spider community to turn over any faster than the controls. In light of this finding, it seems likely that for most of the spider taxa that may ultimately be identified in the GND, invasive weed eradication efforts will not substantially impacte their populations.

Insects

As stated above, taxa from three orders of insects comprise 90% of the documented GND insects; flies, beetles, and leptdopterans (moths and butterflies). Following is a brief description of the biology of these orders as well as bees and their relatives, and dragon flies and how they may potentially be affected, if at all, by the invasive weed control practices currently used in the GND.

Dragonflies

Dragonflies and damsel flies (odonates) in the GND are represented by 6 taxa identified only to genus and several taxa identified only to family (Appendix A). A survey of dragon and damsel flies would very likely turn up many more taxa considering the large number of wetland areas, dragonfly habitat, and abundance of potential prey species available. There is a growing concern in California, but also worldwide, that odonates are imperiled due to the disappearance of the wetland habitats which is their primary habitat for reproduction.

Both larval and adult odonates are predators. Adults eat about anything they can catch, including other dragonflies, but prey mainly on insects taken on the wing. Hunting strategies are either flying after insects (hawking), sallying (darting out from a perch to grab the prey and return) or hover-glean (pick prey from vegetation in flight) (Manolis 2003). Dragonflies are most active during warm, sunny weather during the warmer months between April and October (Manolis 2003). They often perch on vegetation to rest, thermoregulate or wait for prey, sometimes far from water sources. Odonates overwinter as aquatic larvae. The larval stage can last from one to several years depending on species and environmental conditions. Adults generally live a few weeks to a few months.

Potential effects of invasive plant species control methods

Current invasive weed control methods in the GND are not expected to cause more than incidental mortality to odonates. Larval odonates are entirely aquatic and the application procedures for herbicides and the herbicide specified for use near wetland habitats in the GND (i.e., Aquamaster®), should not harm these larvae. Adult odonates may occasionally rest on target weed species, especially the grasses, particularly on cold, windy days but they are generally rather conspicuous due to their large size and bright colors and would likely be observed by the applicators and not sprayed.

Beetles

Of the roughly one million known animals, 75 percent or 750,000 are insects of which somewhere around 300,000 to 350,000 are beetles (White 1983; Arnett 2000). Together with the butterflies, beetles, especially the large and/or strikingly colored, metallic species, are the ‘charismatic megafauna’ of the insect world (Gullen and Cranston 1999). The number of California beetle species is estimated to be over 7,000 to over 8,000 (Powell and Hogue 1979; Evans and Hogue 2004).

Beetles occur in every conceivable terrestrial and freshwater habitat but especially inhabit the ground and either live in the soil or on it using decaying animal or vegetable material (Powell and Hogue 1979). It is their ability to inhabit virtually all terrestrial and freshwater habitats that accounts for their astounding diversity (Arnett 2000). Many adults and larvae eat living plants and some may be serious pests (e.g., cotton weevils). Some beetles, as either larvae or adults, are parasites and many are predators on other insects. Beetles are, however, for the most part primary agents of decomposition of all kinds of plant and animal material. “Living or dead, there is a good chance that most plants and animals are eventually consumed by beetles” (Evans and Hogue 2004).

The primary reason for the success of the beetles through time is their elytra, essentially hardened wing covers (Arnett 2000). The hardness of these covers afford protection to the abdomen and also serves to protect the flying wings from damage when boring into hard woods, tunneling through the soil and so forth. Additionally, most species have the ability to crawl, many rather powerfully, and so combine the ability of flight over distances with the ability to penetrate habitats (Arnett 2000).

Beetle life history proceeds from egg through several larval stages followed by pupation into adults (complete metamorphosis). Typically, there is one generation per year but a few species in some, usually warmer, areas may have 2 or 3 generations per year (White 1983). Adults typically live for a few weeks to several months (White 1983). Winter dormant stages are usually larvae or pupae but in some species it may be the egg or adult. Larvae generally live on or within various parts of plants above and below ground but some are predaceous and some are parasitic as reflected in their various, characteristic body shapes (White 1983; Arnett 2000; Evans and Hogue 2004).

Within the GND approximately 70 taxa of beetles have been identified to genera and many to species, with an additional unknown number of taxa identified to 16 families. Of these, three federal species of concern, one of which, *Lichnanthe albipilosa*, is a GND endemic species, and two species of local concern. In comparison, at the Coal Oil Point Reserve in Santa Barbara Co., a 158 acre coastal sand dune area similar to the GND, over 140 beetle species have been identified (www.sbnature.org). Beetle studies have been relatively intense on the Reserve due, in part, to its proximity to the Santa Barbara

Museum of Natural History, home of the California Beetle Project. The small size of the COPR relative to the GND (an order of magnitude difference) with twice the number of identified beetle taxa suggests that a focused survey of the beetles of the GND would likely double or perhaps triple the known GND beetle taxa and, perhaps, turn up more endemic species.

Potential effects of invasive plant species control methods

Considering that beetles are the most successful animal group in existence, they may also likely be relatively unaffected (as a group) by any of the invasive weed control methods currently in use in the GND. Controlled burns and large-scale mechanical removal of invasive plants, which would generally be limited to larger pure stands of beach grass, would likely have the largest impact on beetles (and most other insects). Ciliated dune beetles (*Coleus ciliatus*) are among the few insects reported to be associated with European beach grass (Slobodchikoff and Doyen 1977) but they are subterranean and not expected to be affected by herbicides. Direct application of herbicides on beetles on the target weeds would likely not affect them due to their tough elytra and relative robustness. Mechanical disturbance by vehicles associated with herbicide applications or controlled burn activities along the high water line in the fore dunes may have a negligible impact on globose dune beetles and tiger beetles in a limited area.

Bees, Wasps, and Ants

Bees in California represent approximately 1,500 species of the over 4,000 species in the United States (Kreman et al. 2002). They are the most well known of the insect pollinators, which also includes insects of many other orders, as well as birds and some mammals. Eight bee species have been identified in the GND. By comparison, at an approximately 25 square mile site in the Pinnacles National Monument in Monterey Co., CA, nearly 400 bee species were identified in a multi-year, systematic study (Messinger and Griswold 2002). Of course the two areas are not strictly comparable; the GND is a coastal sand dune ecosystem with approximately 300 species of plants and the Pinnacles site is an interior chaparral system with nearly 600 species of flowering plants, and may be one of the hotspots of bee diversity in the world (Messinger and Griswold 2002). Still, the known number of bee species in the GND appears to be low. In some areas of northern California and southern Oregon, six to 12 species of bumble bees may coexist in areas as small as 100 m2 (Thorp et al. 2002).

The eight taxa of bees identified by Thorp in 1992 from a one day visit to a revegetated area near Oso Flaco Lake were all common and widespread. He suggests that there may be some interesting (endemic pollen specialist) species of andrenid (burrowing) bees associated with natural populations of beach primrose but none of these bees were found in the revegetated areas near the lake.

Similarly, identified wasps and ants in the GND are represented by only a few taxa, none of special concern. Other than the wide-spread and beneficial European honey bee, there are currently no known alien species of ants, bees, or wasps present in the GND that may potentially pose a problem for native hymenopterans by, for example, competing for the same food resource

Potential effects of invasive plant species control methods

The bees, wasps, and ants in the GND may be minimally affected by current weed control methods. Many bumble bees, wasps, and ants nest in the ground. Their nests may be associated with the targeted invasive species, which may act more as protective structure for the nests rather than as a food source. Bees, but also wasps and ants, are commonly observed on ice plant flowers. Damage to individuals is unavoidable but damage to bee and wasp nests in the ground could kill the queen and should be avoided if possible. Nests of bumble bees are commonly in abandoned rodent burrows and generally are fairly obvious from the bumble bee activity in a fairly small area. A few moments of observation may reveal the nest site which should not be trampled or sprayed.

Butterflies and moths

Butterflies, moths and their caterpillar larval form, the Lepidoptera, are familiar to everyone. Butterflies along with large, showy beetles constitute the ‘charismatic megafauna of entomology’ (Gullan and Cranston 1999). In California there are about 260 butterfly species and at least 4,500 moth species (Powell 2002). Within the GND, 18 taxa of butterflies and 16 moth taxa have been identified (Appendix A). Powell (1981) collected and identified an additional 110 microlepidopteran (generally species of tiny moths) taxa from the GND but these are not yet in the literature or easily available (J.Powell, pers. comm. 2004). Therefore the total reported lepidopteran fauna of the GND appears to be around 150 taxa of which approximately 75% are tiny moths whose species are as yet unreported in the literature. However, the known 25% of the lepidopterans include six species of concern and four species first described from specimens (holotypes) collected from the GND. The potential number of lepidopteran species present in an area such as the GND is suggested by Powell (2002) as more than twice the number of plant species that make up the local flora, which in the GND is roughly 300 species. It can therefore be expected that a focused study in the GND may ultimately yield a lepidopteran fauna of up to 600 or more taxa.

Typical lepidopteran life cycle involves mating, egg laying, larval hatching, larval feeding, pupation, adult emergence, all of which may occur within a period of time from a few weeks to over one year depending on species, local conditions, variations in host plant edaphic factors and other biotic and abotic factors. Typically eggs hatch within a few weeks. Caterpillars may live for several months or more and may enter a diapause stage of up to several months to wait for more favorable conditions before pupation. Pupation lasts for a few weeks before adult emergence. Adult butterflies live for several weeks to a few months.

Among the most important factor regulating butterfly abundance in a particular location over time may be the selection by females of certain characteristics of the host plants upon which to deposit their eggs including species, time of season, and its specific location (Murphy et al 2004). However, the interplay between habitat quality and climate is a critical determinant of the dynamics of local checkerspot butterfly populations (Hellmann et al. 2004).

Lepidopteran larvae, caterpillars, feed for the most part on living plant foliage, flowers or fruit. Caterpillars are the most diverse group of animals that depend on plants; a few species are serious pests (Powell 2002; Murphy et al. 2004). Almost all native plant species are fed upon by caterpillars with species that specialize on grasses, for example, but few that specialize on annual plants (Powell 2002). Larval feeding patterns vary generally depending upon whether the caterpillars are micro- or macrolepidopterans (large moths and butterflies). Microlepidopterans are generally relatively host-specific, confined in some instances to a single plant species (Powell 2002). Similarly, butterfly caterpillars tend to be host plant specific whereas those of large moths tend to feed on several or many unrelated plants (Powell 2002).

Caterpillars exhibit probably the widest array of feeding niches of any other group of plant feeders. These niches are of two general types, internal and external feeders. Internal feeders, roughly 15% of the North American caterpillars, are microleptdopteran caterpillars that are leaf miners, root, stem and seed borers, including some that form galls in the host plant. Externally feeding caterpillars may specialize in new plant terminals, old leaves, inflorescences, fruit, and so on (Powell 2002). Some may be concealed types, typically small, green or brownish, with no obvious pattern while others feed exposed and display “an amazing array of cryptic forms, colors and behavior to elude predators” (Powell 2002).

Most adults feed on nectar, honeydew or other plant liquid, if they feed at all (Murphy et al. 2004). Butterflies may not be selective as to what plants they feed on and many taxa are commonly observed feeding on the flowers of invasive weedy species (Rubinoff 2002). Most butterflies are very sedentary moving within an area of only a few hundred feet from where their lives began as eggs to death (Dixon 2004; Hellmann et al. 2004) while others may fly many hundreds or even thousand miles as is the case for the well known summer monarch. However, most butterflies seem to have high site fidelity but some dispersal does occur, commonly in the early post-emergence period and usually on the order of a few kilometers for checkerspot butterflies (Hellmann et al. 2004).

Potential effects of invasive plant species control methods

Of the invasive species control methods currently used in the GND, grazing and burns may be expected to have the greatest, though likely negligible, effect on Lepidoptera and particularly if grazing and the burns are not closely controlled. The effect is the destruction of some native plant species that are larval food plants. However any effect would be expected to be highly localized and probably negligible when considering 1) the small area affected relative to the very large area of the GND not affected by invasive weeds; and 2) the net benefit to lepidoptera of eradicating the invasive weeds and the concomitant reestablishment of native flora.

While butterflies are not known to be associated with the invasive grass species in the GND, they may use the flowers of the ice plant species as a nectar source (Rubicoff 2002). Removal of this nectar source may have some negligible effect on butterflies that can be expected to be outweighed by the benefits to them of restoring native vegetation in the GND. Careful observation of the flowers of the target ice plant prior to herbicide application should insure butterflies are not inadvertently sprayed.

As far as is known, Lepidoptera are not known to use either European beach grass or veldt grass as an adult food source or larval food plant. Many species of skippers are known to prefer grass species as larval host plants (Brock and Kauffman 2003) but no skippers of special interest are known from the GND and none are known to specifically associate with these invasive grasses although several skipper species associate with European beach grass in its native habitats (various web resources 2004). In any case direct application of herbicide to either caterpillars or adult butterflies may cause death either directly through action of the herbicide or added surfactant or, more likely, by limiting the mobility of the organism and thereby increasing the chances that it will become the prey of some vertebrate or invertebrate predator. However, direct application of a glyphosate herbicide to the eggs of a blue butterfly did not affect the hatching success of the larvae (Sucoff et al. 2002). A similar result might be expected from direct application of herbicide to pupae which are similarly protected by the case from potential harmful effects of herbicides.

<u>Flies</u>

Of all insects, few are probably as important to humans as are flies. No animals except for our own species are responsible for a greater loss of human life and economic loss than flies (Arnett 2000). While 50% of the earth's population may be diseased from fly pathogens and the worldwide damage to agricultural crops by flies is exceeded by few other insects, they are also extremely beneficial to man (Arnett 2000). They control the populations of many harmful insects and are significant in the recycling of dead plant and animal matter. Members of the Diptera occupy almost every conceivable habitat from dry sand to fresh water, salt water, brackish water, sewage, fecal material and rotting animal carcasses. They are free-living as well as internal parasites and highly modified ecto-parasites. Many are extremely irritating to humans such as mosquitoes, gnats, no-see-ums, black flies, deer flies and incredibly dense aggregations of otherwise harmless flies, such as kelp flies. Some flies mimic other insects such as bees and wasps, many are flower pollinators. Few are brightly colored or with redeeming aesthetic value although some have metallic colored eyes and abdomens; some large deerflies can be fairly startling with yellow bodies, large green eyes and black banded wings.

The typical dipteran life cycle of egg, larvae (maggots), pupae to adult can be completed in a matter of days or weeks in some species under optimal circumstances.

In the GND, 67 taxa of flies have been identified to genus, with most identified to species, and a further 12 taxa identified to family (Appendix A). Two taxa are of special concern: the Oso Flaco robber fly (*Ablautus schlingeri*), first collected and identified from Oso Flaco Lake and the Dune Lakes and known from no other location, and *Brennania hera*, a tabanid fly known only from coastal sand dunes within a fairly restricted range. Further dipteran collections in the GND will doubtless turn up more species and perhaps more endemic forms or ones with limited ranges. Over 120 dipteran species were identified from the Coal Oil Point Preserve (www.sbnature.org).

Potential effects of invasive plant species control methods

Considering the tepid successes throughout history of human endeavors to control the depredations, annoyances and disease vector aspects of dipterans, it is difficult to imagine any current or future weed control measures that would have anything more than a negligible, temporarily detrimental effect on flies. Recent examples of large scale efforts to control fly species include the Mediterranean fruit fly in southern California, olive fruit fly in the central areas of the state and the spread of West Nile virus by mosquito throughout the state.

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3.4 Special-Status Invertebrate Species

Nineteen special-status invertebrate taxa, as defined here, that are known from the GND are shown in Table 3-1 below. Table 3-1 also presents three additional taxa that may also be present in the GND.

Scientific name	Common name	Status
Tyronia imitator	California brackish water snail	Federal species of concern
Helminthoglypta umbilicata *Helminthoglypta fieldi*	Big Sur shoulderband snail Field's shoulderband snail	Approx. 25% of the *Helminthoglypta* species in California are species of concern due to limited distribution and specialized habitats. These two species have a fairly large known range and are not in jeopardy but are included due to local interest in banded dune snails.
Ammopelmatus muwu	Point conception Jerusalem cricket	Federal species of concern
Trimeritropis pogonata	Sand dune banded wing grasshopper	May be an endemic to the GND.

Cicindelia oregona	Sandy beach tiger beetle	Species of local interest
Coleus globosus	Globose dune beetle	Federal species of concern
Macrobaenetes sp	Sand treader cricket	This cricket shows up on the Dune Center web site. Information on the slide indicates it was collected on VAFB. It is not considered further here.
Coleus ciliatus	Ciliated dune beetle	Species of concern for FWS Sacramento district; of local interest.
Lichnanthe albipilosa	White sand bear scarab beetle	Federal species of concern; holotype collected in the GND; GND endemic.
Necydalis rudei	Rude's longhorn beetle	Federal species of concern
Areniscythris brachypteris	Pismo Dunes grasshopper moth or Oso Flaco flightless moth	Federal species of concern; holotype collected in the GND; GND endemic
Dannus plexippus	Monarch butterfly	Winter roosting sites are of Federal concern
Eucosma hennei	Henne's eucosman moth	Federal species of concern
Gnorimoschema ericoidesi Gnorimoschema baccharisellоides	Gnorimoscheme moths	Holotypes collected in the GND; may be GND endemics; of local interest.
Icaricia icarioies moroensis	Morro blue butterfly	Federal species of concern
Lithariapteryx elegans	Elegant Lithariapteyx	Holotype collected in GND; narrowly endemic to coastal sand dunes; local interest.
Macrobaenetes sp	Sand treader cricket	This cricket shows up on the Dune Center web site. Information on the slide indicates it was collected on VAFB. It is

		not considered further here.
Thessalia leanira elegans	Oso Flaco patch butterfly	Federal species of concern
Ablautus schlingeri	Schlinger's robberfly	Holotype collected from GND; GND endemic.
	Invertebrate taxa of interest that may be present in the GND	
Brennania hera	Coastal sand dune tabanid fly	Unusual habitat requirements. *B. hera* is a coastal dune endemic; *A. acites* with similar limited range. Neither species collected from GND but their presence is suspected.
Apatolestes actites	Sandy beach tabanid fly	
Macrobaenetes sp	Sand treader cricket	Information indicates this cricket was collected on VAFB. The taxa is not considered further here.

Table 3.1 Guadalupe-Nipomo Dunes invertebrate special-status species.

3.5 Invertebrate Special-Status Species Accounts

Following are species accounts for the special-status species listed in Table 3-1. These accounts present information for species relevant to its habitat requirements and life history aspects in the GND. If little is known about a species that occurs in the GND, information for a closely related species for which more is known about is presented, if available. Also presented is a brief discussion of the susceptibility of the species to impacts from invasive weed control measures, with a focus on herbicide application, as currently practiced in the GND. However, since information on the effects of herbicides on specific animals that occur in the GND is almost non-existent, the discussion of potential effects is generally rather speculative, based on results of studies for other either taxonomically related faunal groups (e.g., other butterfly species) or physical and ecological characteristics of the species (e.g., robustness, burrowing forms, size, soft-bodied).

California brackish-water snail ***Tryonia imitator***

Status

Due to a lack of modern records and an apparent restricted distribution, *Tryonia imitator* was proposed as an endangered species by the U.S Fish and Wildlife Service in January 1977 (FR 42 (8): 2507, 12 Jan 1977) but was officially withdrawn from consideration in November 1979 (Kellog 1980). It appeared as a category 2 candidate species in the Nov 15, 1994 Notice of Review, 56 FR 58982. Thereafter, it appears as a federal species of concern. *T. imitator* is recognized by the state as a special animal (www.dfg.ca.gov/SPAnimal).

Habitat and occurrence within the Guadalupe-Nipomo Dunes

The only documented occurrence of *Tryonia* within the GND is a record for Oceano Lagoon with the statement "collected by Morris E. Caruthers (no date given) probably 1930-40. One empty shell, fresh appearing." (RareFind3). The species was searched for in 1970 at this location by D.W. Taylor (Taylor 1978) but none were found. Kellog (1980) searched 27 sites with known or suspected *T. imitator* habitat between San Luis Obispo and Sonoma Counties, including Oceano Lagoon; *T. imitator* was not found at Oceano Lagoon.

Habitat in other areas

The historical habitat and range of *Tryonia* was tidal lagoons and marshes from the mouth of Salmon Creek, Sonoma County to the mouth of the Tijuana River at Imperial Beach, San Diego County (Kellog 1980). At the locations surveyed by Kellogg in 1979, living *T. imitator* were generally found in coastal lagoons and *Salicornia* (pickleweed) marshes, including a site in San Luis Obispo County where Los Osos Creek empties into Morro Bay, and absent from areas described as "freshwater vegetation". It is able to withstand a range of salinities from 4 to 47 parts per thousand and inhabits a variety of sediment types from fine, silty mud, through coarse sand to coarse gravel covered with silt. It has been found crawling on the sediment and on blades of widgeon or ditch grass, *Ruppia* sp., and on floating mats of the green algae *Enteromorpha* sp. (Kellogg 1980).

Present status within the Guadalupe-Nipomo Dunes

No indication of *T. imitator* was found in the Oceano Lagoon area surveyed around 1970 (Taylor 1978) or 1979 (Kellogg 1980); Kellogg considers *Tryonia* extirpated from this site.

Tyronia seems likely to be extirpated form the GND and Oceano Lagoon because of the many changes that have occurred to the site at Oceano Lagoon since 1930-1940. Two projects affecting Arroyo Grande (AG) Creek in particular changed the nature of the Oceano Lagoon: a project to change the lower three miles of the Creek with levees and tidal gates in 1961 and the construction of Lopez Dam in 1969 (Brown 2002). Together, these projects conserved water and controlled flooding along AG Creek. They also changed the nature of the Lagoon from a relatively larger, deeper estuarine environment accessible by small boats from the ocean (Harold Guiton, pers. com. 2000) to what it is today – a freshwater marsh gradually filling in with organic debris and silt with very limited seawater influence through the tidal gates in the levee that separates Arroyo Grande Creek from Oceano Lagoon. The mouth of AG Creek lacks the extensive estuarine development that appears to be necessary for *Tryonia* (Kellogg 1980).

Life history

Female *Tryonia* brooding young are present year round in northern California (Taylor 1978). At this site, the average shell length of the snails is 1.2 mm; females are larger than males (up to an average of 1.8-2.0 mm shell length). Males may be born sexually mature while females mature postnatally (Kellogg 1980). Gut contents of *Tryonia* contained sediment and diatom frustules; it is suggested that, like other members of this snail family, *Tryonia* is capable of both deposit feeding and grazing (Kellogg 1980). Potential predators include willets, marbled godwits, black-necked stilts, American avocets and long-billed curlews, fish including three-spined stickleback, and some carnivorous snails (Kellogg 1980).

The observed behaviors of floating upside down on the surface tension of the water and feeding on mats of floating green algae may be important factors in their dispersal (Kellogg 1980).

Distribution / Collections

Perhaps the most interesting aspect of *T. imitator* is the geographical distribution of the genus. Eighteen species are recognized in Florida, the Rio Grande Basin, northeastern Mexico, the lower Colorado Basin, the southern Great Basin, Guatemala, and coastal lagoons in California (Hershler 2001). The species in Florida and coastal California appear to be the only ones to inhabit salt water environments.

Potential effects of invasive plant species control methods

Tryonia are in all likelihood extirpated from the brackish water habitats in the GND (Kellog 1980). However, if *Tryonia* have become established since 1979, they would be in areas not treated for invasive species control, i.e., salt-water marshes, and the existing control methods for invasive species in the GND would not be expected to affect them.

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Banded dune snails;
Shoulder band snails ***Helminthoglypta fieldi*** and ***H. umbilicata***

Status

Within the Guadalupe-Nipomo Dunes, the presence of the federally endangered Morro shoulder band snail (*Helminthoglypta walkeriana*) has been either suggested (Roth 1973) or stated as present at Pismo Beach and Oso Flaco Lake (Entrix 1995). However, the presence of Morro shoulderband snails in the GND appears to be unsubstantiated or of little consequence given the new taxonomic interpretation of the species (see attached report by B. Roth, May 2004).

Two species of the genus *Helminthoglypta* are present within the Guadalupe-Nipomo Dunes: *H. umbilicata* and *H. fieldi* (Roth 2004 attachment). These snails in the GND are very near the southern extent of the reported range of the Big Sur shoulderband (*H. umbilicata*) and at the northern extent of the distribution for *H. fieldi*. Neither of these species, nor any of the other land snails known to be in the dunes, has any recognized special status with federal, state, or local agencies or special interest groups. However, as pointed out by Roth 2004 (attached), a close look at *Helminthoglypta* spp. in the GND may turn up “cryptic species” based on morphological characteristics.

The species of *Helminthoglypta* present the GND represent two of approximately 71 recognized species and subspecies of this genus in California (Roth and Sadeghian 2003). Seventeen percent of these *Helminthoglypta* are special status species in California (RareFind 3.1. 2006).The distribution of *H. fieldi* is typical of the genus with a fairly restricted range from Surf, Santa Barbara County to near Pismo Beach, San Luis Obispo County, while *H. umbilicata* has a much wider range from Monterey County south to just inland of Point Purissima, Santa Barbara County on Vandenberg AFB. They are included here as special status species due to the general local interest in banded dune snails as a result of many local surveys for the Morro shoulder band snail and the findings of their wider than expected geographical range and range of habitats where these (Morro shoulder band) snails are found.

Habitat and occurrence within the Guadalupe-Nipomo Dunes

Habitat preference and plant associations of these two species within the dunes are briefly described in Roth (2004) attachment following. Newswanger (2000) states from his observations at Oso Flaco Lake that the “micro-pulmonates,” *Helminthoglypta* spp. and the common, introduced garden snail *Helix aspersa*, prefer the higher dunes where moisture condensation from fog is greater.

Habitat in other areas

At the type locality just east of Point Conception, Santa Barbara County, *H. fieldi* were collected from "under ice plant and sage on the beach" (in Roth 1973). Later studies describe the snail from coastal strand plant community, associated with sea-fig (*Carpobrotus chilense*), Hottentot-fig (*C. edulie*), coastal isocoma (*Haplopappus* [=*Isocoma*] *venetus*), bush lupine (*Lupinus* spp.), and further inland to the coastal sage scrub community (Roth 1973).

Although the ecology of these species within the dune system is largely unknown, broad aspects of their habitat preferences are assumed to be similar to *H. walkeriana* which has been studied in detail. In fact, in one study 43% of the quadrants that contained *H. walkeriana* also contained *H. umbilicata*, suggesting similar habitat preference (Adams et al. 2000).

The following is a summary of habitat and distribution of Morro shoulderband snails in the dunes near Morro Bay, California from Reeves et al. (2000). Morro shoulderband snails tended to reside in the same area for long periods of time. Sites where living snails were found had greater plant litter mass and less open sand (i.e., greater vegetation cover). The abundance of any one species of plant had no predictive value for presence of snails but the population composition of plant assemblages was predictive. Increased numbers of *Senecio blochmanii*, *Dudleya lanceolata*, *Lessingia filaginifolia* var. *filaginifolia* and *Ericameria ericoides* tended to increase likelihood of snail presence while increased numbers of *Salvia mellifera*, *Conicosia pugioniformis*, *Erigonum parvifolium*, *Artemisia californica*, *Lessingia filaginifolia* var. *Californica* and *Lotus scoparius* tended to decrease the likelihood of snails. The former plant species tend to be associated with more mesic (wet) microclimates while the latter species tend to be associated with more xeric (dry) microclimates. Sites with living snails had a greater percentage of the foliage touching the ground, suggesting it is the mirco-habitat created by the vegetation structure that is important rather than anyone particular plant species.

Adams et al. (2000) provides information on *H. walkeriana* plant associations. Thirty-eight percent of the live Morro shoulderband snails in their study were found on or under iceplant, *Carpobrotus* spp. Mock heather, *Ericameria ericoides*, a dominate plant in the dune scrub community, is important to snails also because its typical physiognomic characteristics create favorable micro-habitats for snails. Miner's lettuce, *Claytonia perfoliata*, appeared to be correlated with the presence of live Morro shoulderbands. No live snails were found in or under coyote bush, *Baccharis pilularis*. Within the six plant communities present in their study area, Eucalyptus woodland was the only one in which no living or dead *H. walkeriana* were found.

Present status within the Guadalupe-Nipomo Dunes

The more common of the two *Helminthoglypta* species seems to be *H. umbilicata* based on the number of empty shells encountered (J. Blecha, pers. obs.). The four other species of native land snails documented by Roth (2004, attached) occur within the GND are *Sterkia hemphilli*, *Nearctula rowellii rowellii*, *Striatura pugetensis,* and *Paralaoma servilis*, all taxa with wide distributions. A broader examination of the habitats within the GND may turn up other taxa of native and introduced land snails; several taxa listed in Roth and Sadeghian (2003) are known from San Luis Obispo Co., as well as other coastal counties, suggesting a preference for coastal habitats.

Although the population status within the GND of the *Helminthoglypteas* species is not known, there appears to be little evidence to indicate that they are anything but healthy. GND dune snails and Morro shoulderband snails likely face similar threats to their populations. Threats to Morro shoulderbands include: habitat destruction due to increasing development; structural changes to habitat from dune vegetation senescence; habitat degradation by invasion of non-native plants (veldt grass); and recreational use (USFWS 1998). Of these the last two are the more significant for GND snails but probably less so than for Morro shoulderbands because the GND dune habitats preferred by the snails are much more extensive, and less degraded by these threats, than that available to Morro shoulderbands. Potential threats to Morro *shoulderband snails are: competition with non-native brown garden snail,* Helix, (but no studies show dietary overlap between the species); extinction due to small, isolated populations; pesticides; and non-native predatory snails (USFWS 1998). These potential threats are considered relatively minor to the GND snails at this time but this could change in the future (e.g. accidental introduction of a predatory non-native snail).

<u>Potential effects of invasive plant species control methods</u>
A potential cause of mortality to native GND *Helminthoglypta* is from the control of *Carpobrotus*. Both GND snail species, as well as the Morro shoulderband, are found under mats of iceplant (Roth 1973, USFWS 1998). During hot, dry weather, any potential detrimental impacts to the snails from manual removal or herbicide control of iceplant are likely to be minimal because the snails are buried under the litter. In wet weather they may be up on the plants and more susceptible to harm.

Morro shoulderband snails have been found under European beach grass at sites in Morro Strand State Beach (Walgren 2001; DPR 2001; cited in CEC 2002) and it can be assumed that the two *Helminthoglypta* species present in the GND also use beach grass to some unknown extent. The proportion of Morro shoulderband snails found in association with beach grass was low relative to the total number of snails located in these studies, suggesting that beach grass is not a preferred habitat for *Helminthoglypta* species. Direct herbicide application on snails, such as might occur if herbicides were applied on wet or damp days when the beach grass is wet, when snails may be moving around, may have a detrimental effect. However, when the beach grass is dry, the snails would be expected to remain buried and not susceptible to direct herbicide application. *Helminthoglypta* do not eat live plant material and the herbicides used in the GND degrade in a relatively short amount of time so any dead material ingested would likely not contain harmful compounds.

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MEMORANDUM

TO: Jim Blecha, Tenera Environmental Services
DATE: 26 May, 2004
RE: Guadalupe-Nipomo Dune Snails, and Related Questions

In e-mails of 29 April and 5 May, 2004, you asked me to prepare a report addressing the following terrestrial mollusk questions:

1) What land snails are known from your records or other reputable sources to be in the G-N dunes. This area includes such sites as Oceano, Halcyon, Oso Flaco, Pismo Beach, Dune Lakes, Guadalupe as well as Black Lake Canyon, or sites nearby, on the Nipomo Mesa.

2) Description of habitats where snails collected in these areas including any plant associations.

3) Have Morro shoulderbands (however they are taxonomically recognized by the Feds as endangered, i.e. as a species or subspecies) been reliably recorded as collected or observed from the G-N dunes. [As you noted in your 5 May e-mail, there is some recent news about the distribution and taxonomy of the Morro shoulderband, Helminthoglypta walkeriana; I will address that under this question.]

4) In your opinion, are there any interesting taxonomic or distributional questions relative to the Helminthoglypta species in the G-N dunes. According to your recent Checklist, the species of Sterkia likely to be in the dunes is S. hemphilli and the Nearctula species is likely to be N. rowellii rowellii. Both of these species are widely distributed.

5) What is their general habitat type (wetlands, sand dunes, chaparral etc.); are they fairly common in these preferred habitats within their reported range."

The following conclusions are based on my personal database of land mollusk occurrences in California, my field notes, the pertinent literature, and other sources (such as museum registers) that I consider reliable. These occurrences report terrestrial (land) mollusks only; aquatic mollusks are not considered.

1. Terrestrial mollusks known from the Guadalupe-Nipomo dunes

The following species and subspecies have been recorded within the area designated in your query:

Helminthoglypta fieldi Pilsbry, 1930
Helminthoglypta umbilicata (Pilsbry, 1898)
Sterkia hemphilli (Sterki, 1890)
Nearctula rowellii rowellii (Newcomb, 1860)
Striatura pugetensis (Dall, 1885)

Paralaoma servilis (Shuttleworth, 1852)
Helix aspersa (Müller, 1774) (Introduced)

2. Descriptions of habitats

Very little habitat information is available in the molluscan literature and in museum collection data. Roth (1973a) reported that Sterkia hemphilli, Striatura pugetensis, Nearctula rowellii rowellii (under the name Vertigo californica californica), and Paralaoma servilis (under the name Punctum conspectum) were found in vegetable debris under plant clumps on sand dunes immediately north and west of Oso Flaco Lake. At that site, the vegetation is the Coastal Strand plant community of Munz & Keck (1965), with conspicuous plants including sea-fig (Carpobrotus chilensis),[1] Hottentot-fig (C. edulis), coastal isocoma (Isocoma veneta), prickly phlox (Leptodactylon californicum), and bush lupine (Lupinus spp.). Roth noted that around the roots of these plants the soil is somewhat stabilized, which must allow the accumulation of plant litter that serves as mollusk habitat. In addition the presence of a drip zone under the plants offers summer dampness that probably favors mollusk presence.

Roth (1973A) also reported shells of "an Helminthoglypta similar to H. walkeriana" on top of the vegetable debris at this site but did not observe living members of this species. This reference is to the sample later mentioned by Roth (1973b:151, fig. 4) as "[s]pecimens … in some ways intermediate between H. fieldi and H. walkeriana." It is discussed below in section 4.

Roth (1973b) reported Helminthoglypta fieldi in the vicinity of Surf (near mouth of Santa Ynez River, Santa Barbara County) in association with the Coastal Strand plant community, including sea-fig, Hottentot-fig, coastal isocoma, and bush lupine. He suggested that low, sandy hills directly behind the shore in this region, with the Coastal Sage Scrub plant community (Munz & Keck, 1965) "might provide suitable snail cover as it does for H. walkeriana at Morro Bay" (Roth, 1973b:151).

In February 1998 Dr. Walter B. Miller and I found numerous shells of Helminthoglypta fieldi in sparsely vegetated sand dunes on Vandenberg Air Force Base, Santa Barbara County, on the coast approximately 4 mi N of Surf. These worn shells were accumulating in swales and blowouts in the mobile dunes. At the time, we did not find any living H. fieldi in the area and concluded that these shells were probably lag from an earlier time (decades? centuries?) local conditions were more favorable for snail populations.

Helminthoglypta fieldi has been found around houses. I found one empty shell in a garden cactus patch in Halcyon in 1971. Santa Barbara Museum lot #144575 is from "Lompoc, Mesa Oaks, 1260 Craig Dr. and vicinity" (without more detailed habitat data). In 1971 I found one very juvenile specimen in a roadside drainage gully on the NW slope of Nipomo Mesa SE of Oceano (Roth, 1973b:151).

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[1] Plant names are those used in the reference cited.

Large areas such as the Point Sal and the Casmalia Hills have never been prospected for land snails but would be expected to offer suitable habitats. I am not aware of any mollusk records for Black Lake and wetlands to the east of it, nor for other regional features such as Mud Lake or Big Pocket Lake, where perennial moisture might favor land snail presence.

3. Morro shoulderbands – taxonomic update

In 2003-2004, biologist Jeff Tupen and I conducted an analysis of the shells and anatomy of Helminthoglypta from the vicinity of Morro Bay to San Luis Obispo for client The Morro Group. The results of that study have been submitted to an academic journal (Zootaxa) for publication and are now in press, with publication expected within the next few months. The abstract of that paper reads as follows: [2]

> *Globose-shelled to depressed-helicoid terrestrial snails of the subgenus Helminthoglypta (Charodotes) occur from the vicinity of Morro Bay to the City of San Luis Obispo in San Luis Obispo County, central California, USA. Populations with intensely papillose shells largely or entirely lacking incised spiral sculpture, originally described as "Helix var. morroensis," have been regarded as either a subspecies of Helminthoglypta walkeriana or an infrasubspecific variation without taxonomic significance. Shell form variation is distributed as one would expect if the two major aggregations of individuals were reproductively isolated, biological species, Helminthoglypta walkeriana and H. morroensis. Differing penial morphology is also consistent with reproductive isolation. The two species appear to be allopatric. (Roth & Tupen, in press, p. 1)*

As a result of this study, H. walkeriana is now considered to range from Morro Strand Beach in northern Morro Bay southward to Montana de Oro State Park and inland to at least Los Osos Creek in eastern Los Osos, San Luis Obispo County. The known geographic distribution of H. morroensis ranges from Cayucos southward to Morro Bay, and inland from Morro Bay through the Chorro and Los Osos valleys to San Luis Obispo City. A map with the sampling points and outlines of inferred total distribution will be published as part of the forthcoming paper by Roth and Tupen.

Neither H. walkeriana nor H. morroensis has been found in the Guadalupe-Nipomo Dunes. The southernmost occurrence of H. walkeriana reported in the literature is at Spooner!s Cove, Montana de Oro State Park (Walgren, 2003). The register of the Santa Barbara Museum of Natural History records a lot of H. walkeriana

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[2] Because the publishers of Zootaxa could theoretically assert copyright over material in press, the quoted material provided here probably should be considered a confidential communication. However, the conclusions of the study, especially that there are two species, H. walkeriana and H. morroensis, and that the geographic range of the former is less extensive than previously thought, are becoming widely known to interested parties (cf. Ballinger, 2004) through channels not subject to copyright restrictions.

from Point Buchon; I have not seen that lot, but there is no reason to doubt the identification. Roth (1973b:151) explained that an earlier literature record of H. walkeriana from "the sandy beaches above Point Conception" (Field, 1930) actually referred to specimens of H. fieldi. H. morroensis ranges from Cayucos southward to the town of Morro Bay, and inland through the Chorro and Los Osos valleys to San Luis Obispo City.

Your question ("however they are taxonomically recognized by the Feds as endangered") raises the issue of the official Federal stance on this matter. As of this date, I am not aware that the U.S. Fish & Wildlife Service has issued any formal, public statement relating to the taxonomic conclusions of Roth & Tupen (in press).[3]

4. Interesting taxonomic or distributional questions concerning Helminthoglypta [and other species] in the Guadalupe-Nipomo dunes

Roth (1973b:151, fig. 4) reported "[s]pecimens … in some ways intermediate between H. fieldi and H. walkeriana," from "sand hills on the north side of Oso Flaco Lake." These specimens were said to combine "the open umbilicus of H. fieldi, the large size and tumidity of H. walkeriana, and an intermediate degree of papillation." On a graph of shell diameter versus number of shell whorls (Roth, 1973b:152, fig. 4) fall largely within the scatter of points associated with H. walkeriana rather than with those of H. fieldi from Surf (Santa Barbara County). A more detailed morphometric analysis, such as that by Roth & Tupen (in press) for H. walkeriana/H. morroensis would be interesting. Reproductive system dissection, if living adult snails can ever be found, should show diagnostic features of the penial sac (slender, thin-walled and hourglass-shaped in H. walkeriana, broader and more cylindrical in H. fieldi).

Helminthoglypta umbilicata ranges from Monterey County (Castroville; mouth of Salinas River) to northern Santa Barbara County (San Antonio Road off County Road S20, 1.6 km toward Los Alamos). This is rather a broad range, as ranges in Helminthoglypta go. An interesting taxonomic question would be how much genetic variation takes place over this wide range, and are there perhaps cryptic species, not now recognized on the basis of morphology alone.

The reported range of Helminthoglypta fieldi is from "Pismo" (California Academy of Sciences lot #42776) (presumably, =Pismo Beach) to "Point Conception" (Santa Baarbara Museum of Natural History lots #375 and 3735). I personally confirmed the ID of lot #3735, but whether the label data refers to Point Conception proper or a more generalized area is not known.

The occurrence near Oso Flaco Lake seems to be the northern range endpoint for Sterkia hemphilli. From there it ranges south to Punta Abreojos, Baja California,

[3] The U.S. Fish & Wildlife Service was not a designated recipient of the Roth/Tupen consulting study of H. walkeriana, although it seems likely that by now the Ventura Field office of the USFWS has seen that report in one form or another.

Mexico. All other species range both north and south of the G-N dunes. Striatura pugetensis ranges from British Columbia, Canada, to Isla Guadalupe, Baja California, Mexico; Montana; and the Hawaiian Islands. Nearctula rowellii rowellii ranges from the San Francisco Bay Area to Santa Barbara County. Paralaoma servilis is very widespread (probably mostly through human introduction) in temperate regions of the world, including Great Britain, China, Brazil, Argentina, the Kermadec and Juan Fernandez Islands, and Tasmania. In North America it ranges from Alaska through Idaho and New Mexico to Jalisco, Mexico.

5. General habitat types and abundance

Again, there is not much information available. The species reported by Roth (1973a and 1973b) were on sand dunes, associated with the Coastal Strand plant community. At least Sterkia hemphilli and Nearctula rowellii rowellii were common in that place at that time.

In 1971 I found Helminthoglypta fieldi to be common at the mouth of the Santa Ynez River. On a later field trip in 1998 it required somewhat more effort to find. This was also a sand dune and back-beach habitat.

Helix aspersa, the introduced European brown snail, is apparently quite common now in coastal dunes of San Luis Obispo County (personal communications, various correspondents). It is likely that a search in gardens and agricultural areas in the region would turn up other introduced species of snails and slugs; some of these would be expected over time to escape into more natural areas where conditions of moisture and shelter availability were suitable.

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NOTICE -- LIMITATION OF LIABILITY

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Point Conception Jerusalem Cricket ***Ammopelmatus muwu***

Status

The Point Conception Jerusalem cricket, one of only two species in the genus *Ammopelmatus*, is listed as a species of concern by the state (www.dfg.ca.gov/SPAnimals.pdf) and in RareFind 3.1 (2006), by the International Union for the Conservation of Nature (IUCN; www.IUCN.org) and as an endangered insect by the UC Berkeley Essig Museum of Entomology (www.essig.berkeley.edu).

Of the 8 recorded species of Jerusalem crickets in the genus *Stenoplematus*, at least 6 occur in California (Nearctica 2005). Of these, at least 3 species have fairly limited distributions, generally in areas with extensive dunes, and are considered species of concern by the state. The two species in the genus *Ammopelmatus* are sand dune obligates and both are listed by the state as special animals. To complicate Jerusalem cricket taxonomy somewhat, Vandergast et al. (2003) suggest there may as many as 30 to 50 "song species" of Jerusalem crickets, populations of crickets with unique mating songs.

Habitat and occurrence within the Guadalupe-Nipomo Dunes

Ammopelmatus muwu is known from dunes around Oso Flaco Lake, SLO Co. south to dunes at Point Conception, Santa Barbara Co., including dunes at Vandenberg AFB (Weissman, pers. comm. 2004). Other than being a dune obligate species, little information is available about the habitat requirements of *A. muwu* in the GND.

Habitat in other areas

Specific biological information is not known for the Point Conception Jerusalem cricket. However, presumably they are similar to most other species of Jerusalem crickets in the broader aspects of their habitats.

Jerusalem crickets live most of their lives buried in the ground. They require high humidity and prefer moist light soil although they are also found in deep cracks in adobe soils. They are commonly found in the moist soil under rocks or boards.

Present status within the Guadalupe-Nipomo Dunes

The present status of *A. muwu* in the GND is unknown. The species is apparently rarely collected and then only by specialist collectors. They are apparently difficult to distinguish from the other species of Jerusalem crickets present in the dunes; this distinction may be primarily based on the characteristics of their acoustic signals (stridulations). Plant associations are unknown.

At Oso Flaco Lake dunes, *A. muwu* occurs with a second, undescribed Jerusalem cricket species that, while very rare in the dunes, is common off the dunes in the Nipomo area (Weissman, pers. comm. 2004). The common, widespread Jerusalem cricket (*Stenopelmatus fuscus*), also called the potato bug, is also presumably present in the GND as well.

Life history

The life history of *A. muwu* is unknown specifically but assumed to be generally similar to other species of Stenopelmatidae. The following general information on stenopelmatid biology is from Essig (1926).

Jerusalem crickets are common west of the Rocky Mountains with most species occurring along the Pacific Coast from British Columbia to Mexico. They are large (30 to 50 mm in body length), wingless, formidable looking but harmless, soil dwelling insects. They are nocturnal, remaining hidden in the soil during the day but come out freely at night to feed on roots and tubers of plants and dead animal matter. Because they require high soil humidity, they are most active in the early spring, when mating occurs, and after winter rains. They escape the heat of summer days in burrows up to 10 inches deep. A few dozen, 1/8" oval white eggs are laid in chambers lined with a paperlike material six to ten inches below the soil surface or beneath rocks or boards. Females may kill and devour males after mating. Like other orthopterans, juvenile Jerusalem crickets, or nymphs, resemble adults but are smaller and may molt up to ten times to reach adult size. A typical lifecycle of a Jerusalem cricket may extend over two years.

Jerusalem crickets are preyed upon by a variety of animals including great horned owls and pygmy owls (Brock 1958), American kestrels and many large and small mammals, including some bats.

Potential effects of invasive plant species control methods

How or if Point Conception Jerusalem crickets may be affected by current weed control methods is difficult to assess due to the lack of specific life history and natural history information. To speculate, since they are burrowing animals, herbicides would not likely affect them; any negative effects would likely come from burning or mechanical removal. However, potential negative impacts to this species would likely be very localized and temporary and be out-weighed by reestablishment of native vegetation in the formerly weedy areas.

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Sand dune banded wing grasshopper ***Trimeritropis pogonata***
(not an official common name)

Status

Trimeritropis pogonata is not currently either a state or federal special status species. Powell (1978) suggested it may be endemic to the GND. Although it has been found outside of the GND, it still has a relatively restricted distribution in San Luis Obispo and Santa Barbara Counties (Weissman pers. com. 2004) and is therefore considered here as a species of local concern.

Habitat and occurrence within the Guadalupe-Nipomo Dunes

Information on the habitat of *T. pogonata* in the GND is very sparse. Weissman (pers. com., 2004) states that *T. pogonata* is a coastal sand dune obligate species and he has collected it at Oso Flaco Lake. Although not specifically stated for *T. pogonata*, since other *Trimeritropis* species seem to prefer open, sparsely vegetated conditions*. pogonata* may be expected to occur in open sand areas in the GND.

Habitat in other areas

T. pogonata has been collected in Santa Barbara County (Weissman pers. com., 2004; Strohecker et al. 1968). Other species of this large genus (56 species) occur on bare soil in various sparsely vegetated areas (Strohecker et al. 1968).

Present status within the Guadalupe-Nipomo Dunes

Unknown but expected to still occur in the GND.

Life history

Although this is a large genus with several very common species and some that are agricultural pest species of appreciable economic concern (Powell and Hogue 1979), little seems to be known of their life history. Some species in warm, arid areas have up to three generations per year, but the usual seems to be one or perhaps two. All members of the genus are very similar in that they have brightly colored hind wings, generally with a dark band. As a genus, their flight is noticeable for the colorful patterned wings and rather noisy flight (Arnett 2000). *T. pogonata* may be active between May and August, similar to the activity pattern of *T. infantilis* from Santa Cruz Co. (Hoekstra 1998).

There are several endemic species of *Trimeritropis* (Powell and Hogue 1979), including the federally endangered *T. infantilis*, from sandy areas in the Santa Cruz Mountains (Hoekstra 1998).

Potential effects of invasive plant species control methods

Pertinent aspects of the life history of *T. pogonata* are unknown such as where eggs are laid, plant preference for nymphs and adults, and seasonality and therefore susceptibility to invasive plant control methods as currently practiced in the GND are unknown for this grasshopper. Adult grasshoppers fly readily when approached.

Literature cited

Arnett, R. 2000.

Hoekstra, J. 1998.

Powell, J.A. and C. L. Hogue. 1979.

Strohecker, H. W. Middlekauff, and D. Rentz. 1968.

Weissman, D. Pers. comm. 2004.

Tiger beetle ***Cicindelia oregona***

Status

The species of *Cicindelia* collected from the GND was identified as *oregona* and is likely the subspecies *oregonia* (*Cicindelia oregona oregona*) (Nagano 1980). This subspecies is found throughout western North America and is characterized by Nagano (1980) as one of the most common tiger beetles along the sea coast and in no danger from the activities of man. It is included here as a species of local concern because: 1) it represents an unusual and interesting beetle and; 2) it is highly likely that another tiger beetle species, *C. hirticollis gravida*, the sandy beach tiger beetle, may also be present in the GND although its presence has not been confirmed*.* *C*. *hirticollis gravida* is considered a sensitive species by the state, by the Essig Museum of Entomology (www.essig.berkeley.edu.) and by Nagano (1980), and is listed as an element in RareFind 3.1 (2006). Nagano (1980) further states that it is highly possible that a small population of *C*. *hirticollis gravida* survives in the dunes at Vandenberg AFB.

Habitat and occurrence within the Guadalupe-Nipomo Dunes

Adult *Cicindela* are found on mud or sand near permanent bodies of water. Several species including *C. oregona* are littoral. They can be found along the sandy beach from the waterline where the sand is wet and extends to the drift line where the soil is moist. *C. oregona* prefers dark moist sand in the lower tidal zone (Nagano 1980).

Although *C. hirticollis gravida* are not currently known from the GND, if they were present they could be expected to inhabit sandy areas such as dunes, sand pits and sand blowouts (often far away from water) as well as wetted sand near the high tide mark (Dunn 2004).

Habitat in other areas

This wide spread species is found in similar habitats along sandy beaches throughout its range.

Present status within the Guadalupe-Nipomo Dunes

Unknown. However, it can be expected that the *C. oregona oregona* population is healthy in the areas of the GND beach not open to ORV's (off road vehicles) and where foot traffic is fairly light.

Life history

Tiger beetles are very popular among collectors due to their elaborate, brightly colored and iridescent patterns (Marshall 2004). They run very fast along the sand and take flight readily, usually flying 5 to 20 feet in a level, straight path 1 to 3 feet above the substratum (Dunn 2004).

Kelp flies may make up a significant portion of the diet of adult tiger beetles in the littoral zone. In fact, one recommendation, not applicable to GND resource managers, is that beach wrack not be removed from the beaches in order to provide shelter and a ready supply of food for tiger beetles (Nagano 1980). Nagano (1980) lists this preference of littoral beetle species for feeding on kelp flies as an example of how tiger beetles are beneficial. Adult tiger beetles are preyed upon by a wide variety of animals present within the GND including other insects (dragon flies and robber flies), amphibians, reptiles, mammals such as badger, skunk, fox, opossum, raccoon, and a variety of mice and birds including burrowing owls, kestrels and other raptors, and waterfowl (Dunn 2004).

Two breeding cycles occur among tiger beetles but which one applies to *C. oregona* is not known. Spring/fall species overwinter as adults, emerge in the spring, mature, mate, oviposit and die off in succeeding weeks. A new brood emerge in late summer/early fall, feed but are not mature and overwinter to emerge in the spring. Summer species overwinter as pupae and emerge in late spring/summer, feed, mate, oviposit and die before winter (Dunn 2004). Since several species of tiger beetles may inhabit the same area, having different breeding strategies such as this creates a temporal separation that helps eliminate direct competition for prey species (Dunn 2004).

Larvae live in burrows ranging in depth from a few feet to over 2 meters. They are highly modified forms and very effective ambush predators, capturing prey species that come near the burrows (Nagano 1980). The larval stage comprises the longest portion of the tiger beetle life cycle and larval habitat is the limiting factor controlling population levels of tiger beetles (Dunn 2004).

Potential effects of invasive plant species control methods

The dangers to tiger beetles in southern California, where several populations have been totally eradicated, are from urban expansion, insecticide use, oil spills, and increased recreational use of the beach (Nagano 1980).

Adult tiger beetles are relatively immune to human intrusion but larval tubes are easily collapsed, killing the larva. Intensive foot, animal and, especially ORV, traffic can decimate tiger beetle populations (Nagano 1980).

Nagano (1980) notes that tiger beetles are very susceptible to insecticides and gives several cases where great reductions were caused in tiger beetle populations through their injudicious use. The occurrence of these beetles along the shoreline and perhaps into the most seaward extent of European beach grass may cause them some mortality when using herbicides in this area.

Recommendations

- Do a focused survey for *C. hirticollis gravida* along GND beaches.
- Be aware of beetles when applying herbicide on European beach grass or ice plant growing near the line of highest tides/storm surge (wrack line).
- Do not remove kelp from high shore. Be otherwise careful when cleaning out debris after large storms or strong outflows from coastal streams as this material affords shelter and food to tiger beetles.

Literature cited

Dunn, G. 2004.

Marshall, S. 2004.

Nagano, C.D. 1980(82).

RareFind 3.1. 2006 (CDF&G 2004).

Dune beetle *Coelus ciliatus*

Status

Not currently listed as a species of concern by either state or federal agencies. This dune beetle is of local interest because of its central role in a study in the GND which demonstrated that insect numbers in areas of non-native vegetation are reduced compared to areas of native vegetation (Slobodchikoff and Doyen 1977). *Coelus ciliatus* is one of four species of *Coelus* described from California (Nearctica 2005). All species occur in sandy environments; their distribution may be limited by the patchiness of this preferred habitat. Of the four species, C. ciliatus may be the most widely distributed and abundant; the three other species of *Coelus* are listed as species of concern by the USFWS.

Habitat and occurrence within the Guadalupe-Nipomo Dunes

Adult and larval *Coelus ciliatus* were observed and collected at Pismo State Beach and on the Dune Lakes Ltd. properties in the mid-1970's (Slobodchikoff and Doyen 1977). Their habitat preference was for sparsely vegetated areas behind the foredunes, perhaps in association with the sand verbena (*Abronia umbellata*) and sandmat, (*Cardionema ramosissimum*) (Slobodchikoff and Doyen 1977). On dunes with native vegetation, the number of *C. ciliatus* declined as the proportion of open sand increased; with a maximum density at the Pismo State Beach site of approximately two to three beetles per m^2 (Slobodchikoff and Doyen 1977). On dunes dominated by European beach grass, the number of *C. ciliatus* remained low relative to natural dunes, regardless of the proportion of open sand. At the Dune Lakes Ltd. site, in an area of dunes well stabilized by coastal dune scrub, the abundance of beetles was similar to that of beach grass dominated dunes, about one beetle per two m^2 (Slobodchikoff and Doyen 1977).

Habitat in other areas

C. ciliatus is common in Pacific coast dunes from British Columbia south to Baja California Norte (Doyen 1976; Arnett 2000). It occurs in ancient dune substrata located near Los Angeles International Airport, often in very heavily disturbed settings, but never in irrigated sites (Hovore, pers. comm. 2004).

At Coal Oil Point Preserve in Santa Barbara County, *C. ciliatus* are abundant in the sand near vegetation and easily collected using a common kitchen strainer (C. Sandoval, pers. comm. 2005).

Present status within the Guadalupe-Nipomo Dunes

C. ciliatus is very likely still present and abundant within its preferred habitat in the GND. Slobodichoff and Doyen (1977) indicate their distribution and abundance is reduced in areas with dense stands of European beach grass.

Life history

Life history information for *C. ciliatus* is scant. A member of the family Tenebrionidae, or darkling beetles, which includes the familiar, so called "stink bug", these beetles are characteristic of arid environments. *C. ciliatus* is oval, relatively small at 5.5 to 7.5 mm length, with a dark brown to black body with a shiny, coarsely punctate surface and sides with long, pale, hair like setae (Arnett 2000). Both adults and larvae burrow in the sand, seldom venturing above the sand surface; both life stages are present throughout the year (Doyen 1976). It can be expected that many aspects of the life history of *C. ciliatus* are similar to that of the congener *C. globosus* in the following species account.

Potential effects of invasive plant species control methods

The association between *C. ciliatus* and European beach grass, as documented by Slobodchikoff and Doyen (1977), shows that the density of beetles in areas dominated by this grass is less than that of similar areas with native vegetation. This, at least, suggests that removal of beach grass may result in an increase in the population of this dune beetle where beach grass was eliminated and revegetated with native species. Dune beetles spend the majority of time buried and are not expected to receive direct application of herbicide. Even if this did occur in areas where herbicides are applied to beach grass, beetles are robust forms and should be little affected by the herbicide. Some mortality may be expected from burning and large scale mechanical removal of beach grass. This mortality, however, may, reasonably, be considered minimal to the GND population of *C. ciliatus* as a whole considering the relatively small area affected by control measures compared to the unaffected areas of the dunes and the overall beneficial environmental effects of controlling the spread and/or elimination of beach grass in the dunes.

Literature cited

Arnnet, R. H. 2000.

Doyen, J.T. 1976.

Hovore, F. Pers. comm., 2004.

Nearctica 2005.

Sandoval, C. Pers. comm., 2004.

Slobodchikoff, C.N., and J.T. Doyen. 1977.

Globose dune beetle *Coelus globosus*

Status

Currently listed as a federal species of concern; followed by RareFind 3.1 (2006). *Coelus globosus* is one of four species of *Coelus* described from California (www.Nearctica.com. 2005), three of which are special status species by either federal or state agencies. All species are restricted to coastal sand dunes and beaches along the Pacific coast. Globose dune beetles are considered at risk in California to bring attention to the fact that their coastal sand dune habitat is disappearing (www.essig.berkeley.edu).

Habitat and occurrence within the Guadalupe-Nipomo Dunes

Globose dunes beetles are distributed in coastal sand dunes southward from British Columbia to Baja California Norte, Mexico (Doyen 1976). While these beetles have been collected within the GND at Pismo Beach, they have not been recorded at either Pismo State Beach or Monterey in over 30 years (prior to 1976) and “may now be extinct at these sites” (Doyen 1976). Doyen (1976) did not determine plant associations of *C. globosus* at Pismo Beach. More recently, a pilot study of fore dune plant restoration on the Guadalupe Oil Field tentatively identified dune beetles as *C. globosus* as present in the study area (Entrix 1994). Given that these beetles are pretty much restricted to the foredunes, and *C. ciliatus* is generally found further inland from the foredunes, the tentative identification of these beetles as *C. globosus* may be justified. *C. globosus* are easily distinguished from the sympatric *C. ciliatus* by the large body size (Doyen 1976).

Habitat in other areas

At Point Mugu Naval Air Station in Ventura County, *C. globosus* are found in the sand dunes of the barrier beach along the entire length of the air station (RareFind3).

At Haskel’ls Beach sand dunes, 4.8 miles west of Goleta, S.B. County, globose dune beetles were located in a narrow dune area with 10-30% cover of *Franseria chamissonis*, *Cakile edentula*, *Atriplex* sp., and *Abronia maritima* (RareFind 3.1, 2006). Beetles at Elwood Beach, west of Goleta, were found along a strand beach under litter and in sand under *Atriplex* sp. (RareFind 3.1. 2006). To the north, *C. globosus* at Pfeiffer Beach, Big Sur, Monterey County, were found along the sandy beach and along the coastal bluffs in sand under *Cakile maritima* (RareFind 3.1. 2006).

C. globosus from Coal Oil Point Reserve, near the University of California Santa Barbara’s West Campus were commonly found associated with *Ambrosia chamissonis* and *Cakile maritima* (Sirovic 2000). Snover (1992) reports globose dune beetles were found more frequently and in higher numbers under *Ambrosia chamissonis* than under either *Cakile maritima* or *Carpobrotus edulus*.

Present status within Guadalupe-Nipomo Dunes

The presence of *C. globosus* needs to be verified and their distribution and abundance determined throughout the GND.

Life history

C.globosus is a member of the beetle family Tenebrionidae, or darkling beetles that include the familiar “stink bug.” Adults are flightless, lacking functional wings, which may partially explain their erratic distribution in the northern portions of its range. Doyen (1976) recorded populations from Pt. Reyes peninsula Marin County, Santa Cruz, Santa Cruz County, several localities around Monterey Bay, Monterey County, and at Pismo Beach, San Luis Obispo County but intensive collecting yielded no specimens from intermediate points. They have been described as relatively abundant in some areas (Doyen 1976). Populations in Monterey and San Luis Obispo Counties occur only in the foredunes, within about 30 m of the high tide line. Factors that might limit the distribution of *C. globosus* to this zone are soil salinity and temperature, which vary in a steep gradient from the coastal strand over a short distance inland. The presence of a few individuals in sand occasionally covered by very high tides indicates a high resistance to seawater immersion.

The following general description of the biology of *Coelus* is from Doyne (1976).

All species of *Coelus* are strongly fossorial (burrowing or digging) and are restricted to sand dunes or extremely sandy substrates. They are flightless, relatively sessile beetles that remain buried beneath the sand for much of the time. Both adults and larvae will move out onto open sandy areas, especially at night or on cool, foggy days but most beetles return to shaded areas each day. The beetles leave characteristic furrows when they dig through the sand just below the surface during these movements. Generally, they are found beneath various herbs and shrubs within 5 to 10 cm of the surface.

Both adults and larvae are present throughout the year. Limited data suggests that the numbers of adult *C. globosus*, which may live for up to one year, peak during late spring and early summer. Adults and larvae are detritivores, feeding on material under and on top of the sand (NatureServe 2005).

Snover (1992) determined that globose dune beetles preferred the *Cakile* roots, *Ambrosia* leaves, *Cakile* leaves, *Ambrosia* roots and *Carpobrotus* roots, in that order. In Coal Oil Point Preserve, Sirovic (2000) found that *C. globosus* showed no preference in their distribution for sand slope steepness or orientation. Although observation indicated a preference for *Ambrosia chamissonis*, preference experiments did not imply any preference between *Ambrosia* and *Cakile*. *C. globosus* seemed to dislike *Abronia*, however, while *C. ciliatus* preferred to live close to *Abronia* and may explain the differences in the distributions of these two beetle species (Sirovic 2000).

Potential effects of invasive plant species control methods

Carpobrotus and European beach grass both grow within 30 to 50 yds of the high tide line in the GND foredunes, the area where globose dune beetles occur. Because they are burrowing forms, direct application of herbicides is unlikely. In the event that it did occur, their tough elytra and general robust nature would suggest that they would be little affected. The effect of ingestion of herbicide treated plant material is unknown. Some globose dune beetle mortality may occur in the fore dunes by vehicles associated with weed control efforts.

Literature cited

Doyen, J.T. 1976.

Entrix, Inc. 1994.

NatureServe. 2005.

Nearctica 2005. www.nearctica.com

RareFind 3.1. 2006. (CDF&G 2004).

Sirovic, A. 2000.

Snover, S.A. 1992.

White sand scarab beetle *Lichnanthe albipilosa*

Status

White sand scarab beetle, *Lichnanthe albipilosa*, is listed as federal species of concern and listed as an element in RareFind 3.1 (2006). It is only known from a few sites in the GND. There are eight species in *Lichnanthe*, with two species in eastern states and six species in western states. Only two western species inhabit coastal sand dunes, and while similar to one another and distinctly different from the other four species, they are not sympatric (Carlson 1980).

Habitat and occurrence within the Guadalupe-Nipomo Dunes

An adult female of this beetle was first collected in 1968 at Oso Flaco Lake. Later collections from 1972 through mid-1980 resulted in a total of 11 adult beetles, 5 females and 6 males. All beetles were collected from either Oso Flaco Lake or Dune Lakes (Carlson 1980). One male was collected from *Coreopsis* sp.

Carlson (1980) describes the habitat as coastal sand dunes in San Luis Obispo County, CA. On three occasions in the 1970's, beetles were collected flying or hovering close to the surface of dunes near Oso Flaco Lake, some distance from the surf. Although the area between the surf and the lake were searched on three occasions for adult beetles, no specimens were observed (Carlson1980). It was concluded that the species is distributed along the inland edge of the dunes adjacent to the lake. Four specimens came from nearly the exact same spot on different occasions (Hovore, pers. comm. 2004).

Habitat in other areas

Lichnanthe albipilosa appears to be an endemic species in the Guadalupe-Nipomo Dunes.

Present status within the Guadalupe-Nipomo Dunes

White sand bear scarab beetles are assumed to be present within the GND but they have apparently not been observed since 1980 (Carlson 1980). Their known habitat, inland from the surf and near the margins of standing water, and perhaps also on or associated with *Coreopsis*, exists at other areas in the dune system besides just Oso Flaco Lake and the Dune Lakes, such as at the ponds on the Guadalupe Oil Field site. A focused survey for these beetles may reveal that they are more widely distributed and more abundant in the dunes than they appear to be now.

Life history

Other than the sparse details of their distribution and apparent habitat preferences in the Guadalupe-Nipomo Dunes, almost nothing is known about the life history aspects of this beetle. Males are described at 13.5 to 15.5 mm in length and 5.0 to 6.0 mm in width while females are somewhat larger at 15.50 to 17.5 mm length and 6.5 to 7.0 mm width (Carlson 1980). The activity period is probably from mid-morning to mid-afternoon on sunny days (Carlson 1980). All specimens were collected between April and June of various years. Larvae of other species of *Lichnanthe* feed on decaying leaves and other organic debris near streams (Arnett 2000).

Potential effects of invasive plant species control methods

Unknown.

Literature cited

Arnnet, R. H. 2000.

Carlson, D.C. 1980.

Hovore, F.T. 2004.Pers. comm.

RareFind 3.1. 2006. (CDF&G 2004).

Rude's longhorn beetle — *Necydalis rudei*

Status

Rude's longhorn beetle, *Necydalis rudei*, is a California state species of concern (Evans and Hogue 2004) and is listed as an element in RareFind 3.1 (2006).

Habitat and occurrence within the Guadalupe-Nipomo Dunes

The type specimen of *Necydalis rudei* was collected from GND (Hovore, pers. com. 2004) and has been collected only a few times by specialists. Little is known of its population numbers, habitats or life history. Dr. Hovore (pers. com. 2004) collected *N. rudei* from around Oso Flaco Lake when “the entire area was overrun with dune buggies and duck hunters." The beetles he collected were in the narrow east-facing portion of the first set of dunes just above Oso Flaco Lake, where the *Ericameria* was mixed into a large stand of poison oak.

From Hovore (pers. com. 2004) "*N. rudei* larvae feed within the lower stem and roots of *Haplopappus* (*Ericameria*) *ericoides* in the dunes. The relationship of the beetle to the plant versus substrate values has not been determined but it may occur with this host (or others) elsewhere."

Habitat in other areas

Known from Jalama Beach, Santa Barbara County; may possibly occur in stabilized substrates away from the dunes as well (Hovore, pers. com. 2004).

Present status within the Guadalupe-Nipomo Dunes

Unknown but assumed to still be extant in the GND.

Life history

N. rudei is one of seven species of *Necydalis* known from the United States (Arnett 2000); other species are represented in European fauna (Evans and Hogue 2004). Members of this genus have elongated, narrow abdomens and together with long wings, very short elytra (wing shields) and reddish color, resemble wasps (Evans and Hogue 2004). Larvae of other *Necydalis* species bore into trees including oak and eucalyptus and adults of another US species flies and sounds like a large bee (Arnett 2000). Based on this, *N. rudei* can be expected to look and fly like a wasp or hornet and, although not known for certain, probably has one generation per year with adults living for a month or so (Arnett 2000; Evans and Hogue 2004).

Potential effects of invasive plant species control methods

Rude's longhorn beetles are expected to occur in unknown numbers within the GND and may be locally abundant in some areas. *Ericameria ericoides*, their one known host plant, is common and abundant in the GND. There is no indication that these beetles are associated with the invasive weed species other than perhaps to rest on them. If herbicides used for control of the invasive species are applied specifically to the target plants, according to current procedures, overspray onto native *Ericameria* species and other native vegetation will be minimized and no harmful effects are expected to occur to the beetle.

Literature cited

Arnett, R. 2000.

Evans, A., and J. Hogue. 2004.

Hovore, F.T. Pers. comm., 2004.

RareFind 3.1. 2006. (CDF&G 2004).

Oso Flaco Flightless Moth *Areniscythris brachypteris*

Status

Federal species of concern. The holotype specimens were collected near Oso Flaco Lake; the species is considered to be a GND endemic species. Listed as an element in RareFind 3.1 (2006).

Habitat and occurrence within the Guadalupe-Nipomo Dunes

All of the following information on the Oso Flaco flightless moth is entirely from Powell (1976).

Larvae collected in April 1968 at the inner dunes near Oso Flaco Lake, they were so bizarre in body form and activity that they were not recognized as caterpillars in the field. In the laboratory they were determined to be highly modified moth caterpillars; nothing comparable was represented in the literature.

In 1971, increased off-road vehicle activity was eliminating the stabilized dune flora of the type locality at Oso Flaco Lake and arrangements were made to access a similar site at Dune Lakes Limited, a strictly controlled private property. In June 1972 a strong colony of moths was found there and a collection was made which formed the basis for the description of a new genus and species of moth *Areniscythris brachypteris.*

Adult *Areniscythris brachypteris* are diurnal flightless moths with reduced wings, enlarged hind tibiae and elongated tarsi. They run on open sand and leap 10 to 15 cm in height, enabling passive dispersal by wind. Larvae (caterpillars) are extraordinarily elongate with thin numerous setae of extremely reduced size. Caterpillars live in sand-covered silken tubes attached to buried, green parts of several plant species (*Phacelia distans*, *Lupinus chamissonis*, *Ambrosia chamissonis, A. bipinnatifida*, *Monardella crispa* and *Senecio blochmaniae*) located at the margin of active, moving sand dunes.

Habitat in other areas

The Oso Flaco flightless moth is apparently an endemic to the GND as it has been collected from only four areas, all within the dune system; Dune Lakes (type locality), Oso Flaco Lake, North Beach at Pismo State Beach, and the mouth of the Santa Maria River.

Present status within the Guadalupe-Nipomo Dunes

The current status of the GND endemic Oso Flaco flightless moth is unknown. While it may be reasonably expected that these moths are still present within the dune system in their preferred habitat of open sand near vegetation, they have not been reported since their original collection in the mid-1970's. In fact, these moths may be rather wide spread in the dune system.

Access to the majority of the GND is difficult at best and is generally by foot; it is a generic problem with any biological studies in the GND and especially so with animals because of their mobility. The areas with relatively easier access, which usually implies vehicular access, are the sites where these moths have been collected. A rigorous sampling program designed specifically to map out the presence and abundance of these moths may show them to be more widespread and abundant in the dune system.

<u>Life history</u>

Larvae of *Areniscythris* are extraordinarily elongate (10 to 13 mm length) with reduced head, legs, and setae - modifications similar to other sand dune dwelling organisms. They may have narrow tolerance of edaphic (soil) conditions preferring open, moving, fine grained (0.25 mm dia.) sand and tend to be most numerous on lee slopes. Microhabitat differences with regard to shade and degree of exposure had no apparent effect on abundance.

Larvae move just beneath the surface, creating a silken tube that becomes encrusted with a coating of the fine-grained sand. Larvae feed on partially buried green vegetation which they encounter apparently largely by chance. Food plant acceptance appears to be indiscriminate. Nearly all shrubs that are able to tolerate partial burial of green stems and leaves are eaten including *Phacelia distans*, *Lupinus chamissonis, Ambrosia bipinnatifida, Monardella crispa* and *Senecio blochmaniae*. Feeding larvae attach their tubes to buried vegetation and may become buried several cm deep by drifting sand. Abandoned galleries of dry tubes may build up on plants.

Adult *Areniscythris* are 4 to 5 mm in length, stout, sand-colored and bear a superficial resemblance to small grasshoppers. Their apparent preferred habitat is open dune slopes in a narrow zone adjacent to the stabilized chaparral/dune scrub. Adults are infrequent on open sand more than 50 m from the nearest vegetation and can occur in small patches of open sand a few meters into the stabilized flora. There are no specific plant associations; no moths have been observed on a living plant. Although they have fully functional mouthparts, adult moths were not observed to respond to flowers and do not appear to be dependent on continuous nourishment.

Adults moths can live for up to 20 days and are most common from early May through late August. They are diurnal, restricting their activity mainly to periods of sunshine and becoming less active in the later afternoon and on overcast, foggy and windy days. Their movement is described as scuttling, which they can do for up to 5 m. They can jump to a height of 10 to 15 cm and can remain airborne for 1 or 2 seconds; on windy days, a series of jumps can move the moth up to 10 m downwind.

Digging is one of the more remarkable aspects of *Areniscythris*. Two types of pits are excavated in the sand. One type may be in response to strong air movement at the sand surface and is excavated on the lee side of a dune crest. The moth digs with its hind legs and rests in the pit partially covered with sand, head pointed uphill. The second type of excavation is dug in the later afternoon and is where the moth remains fully covered until morning.

There are three main points regarding the biological significance of *Areniscythris brachypteris*

- *A. brachypteris* is the only known lepidopteran in the continental US where both the male and female are flightless;

- The type locality is the Dune Lakes and to date the GND are the only locality where it has been collected. For this reason and the fact that larval galleries (masses of dry larval tubes), conspicuous indicators of *A. brachypteris* populations, have not been observed at other coastal dunes in Oregon, California or Baja California, Mexico, this species is considered an endemic to the GND.

- There is an interesting evolutionary parallel, regarding flightlessness and the jumping ability of this moth, drawn between oceanic islands, where flightlessness is relatively more common among animal orders, and coastal dune habitat: integral factors that favor the evolution of flightlessness in both of these habitats are the reduced predation pressure in simple biological communities and the prevalence of strong onshore winds.

<u>Potential effects of invasive plant species control methods</u>

Herbicide applications would not appear to be particularly detrimental to *A. brachypteris* as their larvae are burrowing forms associated only with native plants and the adults seem to prefer areas of open sand. Off highway vehicle use near the type location was felt by Powell (1976) to be detrimental to the moth due to the changed the nature of the dunes and dune plant community. Therefore vehicles used to control burns or apply herbicides as well as by any large scale mechanical removals may negatively impact these moths. However, any negative impacts to this species are likely to be very localized and temporary and out-weighed by reestablishment of native vegetation in the formerly weedy areas.

<u>Literature cited</u>

Powell, J.A. 1976.

RareFind 3.1. 2006. (CDF&G 2004).

Monarch butterfly *Danaus plexippus*

Status

Monarch butterflies (monarchs), *Danaus plexippus*, are arguably the most famous butterfly in North America, perhaps the world (Brock and Kaufman 2003) for their striking color and patterns, spectacular migrations and dense aggregations in winter gathering places. However, despite their renown and abundance, monarchs are vulnerable to large scale fluctuations in abundance due to a variety of natural and anthropogenic factors. For that reason, monarchs are recognized as a California special resource (RareFind 3.1 2006), are the object of much research, and are followed closely by special interest groups such as the invertebrate conservation group the Xerces Society and Monarch Watch (www.monarchwatch.org). Their winter roosting sites are considered a high priority by state and federal agencies.

Habitat and occurrence within the Guadalupe-Nipomo Dunes

From about October until February or March, monarchs are common in the GND, as they are in many areas of coastal San Luis Obispo County. In late summer and early fall, monarchs move through the area, on their way to winter roosting areas to the south. By late fall, the majority of the monarchs seen locally are going to or are in their winter roosting areas. One significant source of the monarchs in the GND in winter is the Pismo Beach Monarch Butterfly Grove near the mouth of Pismo Creek. This site is one of the largest winter roosting sites for monarchs in California with historical abundances during winter months exceeding 200,000 monarchs (CCNHA 2004). Interestingly, in the Smith et al. (1976) report on GND biological resources, with an emphasis on wetland resources, neither this roost site, nor the butterflies themselves, were mentioned. At the time of this report, monarchs were either not present in any reportable numbers in the GND, were considered by the authors to be outside of the scope of their report, or were of no particular interest. Evidently the spectacular winter aggregations had yet to form at this site at that time. Occurrences cited in RareFind 3.1 (2006) in the general GND area suggest that the number of monarchs at winter aggregation sites, as well as the locations themselves, are quite variable over a period of a few years.

Monarch uses of habitats within the GND are of three types. Of primary concern are the winter roosting sites such as at Pismo Beach. At this site, as with other winter roosting sites in California, monarchs spend the majority of time in tight clusters but make brief flights on relatively warm sunny days to drink nectar or reposition themselves in the canopy (CalPoly 2004). These sites are commonly in eucalyptus but sometimes native pines and cypress are used. Ironically, monarchs chiefly overwinter in non-native eucalyptus and it is likely that had these trees not been introduced in the 1850's the phenomenon of mass-wintering monarchs would not exist in California today (Pyle and Monroe 2004).

A second use is autumnal roosts, which may be in eucalyptus or native pine trees as well, but are generally only occupied for a month or so by monarchs on their way to their winter roosting sites. Autumnal roosts are abandoned by December. The third habitat is the GND complex in general where adults may be found on warm days searching for flowers and nectar. In some cases eucalyptus and willow trees, also used for roosting, provide the nectar source (Meade 1999). Monarchs are not known to reproduce in the GND (New Times 2005).

Although monarchs are common fall to early spring around the eucalyptus trees in Black Lake Canyon (BLC) and around Black Lake, neither area is a major wintering roost site (major sites have more than 50,000 monarchs during the winter). An area near BLC was identified as a major winter roosting area prior to a major housing/industrial development and mitigations were enacted to spare the site. Although modifications to this site have changed its micro-climate and reduced monarch numbers, it is still expected to remain a major winter roost site (New Times 2004). However over time, conditions favorable to the monarchs can change and result in establishment of a new winter roosting site, perhaps in an area near BLC or Black Lake.

Habitat in other areas

Winter roosting monarchs, the type that occur in the GND, migrate to this area to overwinter in a warm climate. Monarchs may roost in a variety of trees including pines, oaks, cypresses, palms, sycamores and willows (Meade 1999). They generally do not feed extensively, although they may nectar on warm days, but live off of stored nutrients and fats for their 6 to 9 months life span. They breed prior to leaving this area in February or March. Habitats of the western monarch from this time until they return, several generations later, are intimately associated with milkweed plants (*Asclepias* spp.), their larval host plant.

Present status within the Guadalupe-Nipomo Dunes

During the winter months and into early spring, monarchs are very common in GND habitats. Numbers of overwintering monarchs at the Pismo Beach Monarch Grove vary from year to year from 20,000 per year to over 200,000 (CCNHM 2004) due to factors generally not related to local (roosting habitat) conditions.

Life history

Monarchs in the GND are over wintering, also termed winter monarchs. They are perhaps one or two months old when they arrive in the winter roost sites from areas west of the Rocky Mountains and north into Canada. As spring nears and weather warms, the monarchs mate and begin dispersing to the west and north where milkweed plants are germinating. When suitable areas are encountered, the eggs are deposited and the adults die, having lived 6 to 9 months. Several generations of “summer” monarchs are produced, each one living one or two months and generally going north with warming weather and growing milkweed. The last generation born the farthest north does not breed but eats and stores up nutrients for the southward migration to winter roosting sites.

Potential effects of invasive plant species control methods

Monarchs do not reproduce in the GND and occur there only as adults. After breeding in the winter roosting sites like Pismo Beach, monarchs apparently fly into the San Joaquin Valley to lay their eggs on milkweed plants (New Times 2005). Adults are not expected to be appreciably susceptible to harm from exotic plant removal methods as currently practiced. Eucalyptus trees to be removed should have prior observations in both the fall and winter for signs of monarchs use as roosting sites. Care should be taken when applying herbicides to the iceplant species so that butterflies using the flowers are not sprayed.

To speculate, any mortality caused to monarchs in the GND attributable to weed control methods as currently practiced may be negligible as compared to mortality caused by collisions with vehicles along Highway 1 near the Pismo Beach Monarch Grove during the winter months (J. Blecha, pers. obs.). Automobiles are recognized as a significant cause of death to butterflies in certain areas at certain times (Brock and Kaufman 2003).

Literature cited

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Pyle, R. and Mia Monroe. 2004.

RareFind 3.1. 2006. (CDF&G 2004).

Smith, K.A., et al. 1976.

Henne's eucosman moth ***Eucosma hennei***

Status

Federal species of concern.

Habitat and occurrence within the Guadalupe-Nipomo Dunes

Henne's eucosman moth, *Eucosma hennei*, reported by Dr. J. Powell, UC Berkeley, Essig Museum of Entomology from the Dune Lakes, near Oceano, San Luis Obispo County (date unknown), is apparently the sole record of this moth from San Luis Obispo Co. (NatureServe 2005).

Habitat in other areas

E.hennei was originally described in 1940 from specimens collected in coastal sand dunes in El Segundo, Los Angeles Co., (www.sel.barc.usda.gov) with a range originally reported as coastal southern California from Ventura Co. to Orange Co. Their habitat is described as undisturbed coastal sand dunes with native vegetation, including areas of open sand and fairly dense shrubs and herbs, including *Phacelia* spp., the host plant for the caterpillars (NatureServe 2004). Larvae of other species of *Eucosma* from California have been collected from the roots of E*ricameria* sp. and *Artemesia* sp. (Ferris 2005).

Present status within the Guadalupe-Nipomo Dunes

Unknown. There is only one record of this species from the GND (NatureServe 2005), identified by Dr. J. Powell, UC Berkeley Essig Museum of Entomology, a specialist in moths and very familiar with the GND.

Life history

E. hennei is a microlepidopteran moth in the family Tortricidae, the leaf-roller moth family. Approximately 1,100 species of tortricid moths in 91 genera occur in the US (141 species of *Eucosma*) and about 6,700 species worldwide (Arnett 2000). A great many species of this family are very serious pests on fruit seeds, forest trees, and ornamentals. In the US they include spruce budworm, apple codling moths (the “worms” in apples), and the Mexican jumping bean borer (Arnett 2000). Larvae of some tortricid moths bore into stems, leaves, and fruit and others make webs on leaves and others are leaf rollers or leaf tiers. Adults of some species are diurnal.

Potential effects of invasive plant species control methods

Unknown. This moth is known primarily from coastal dunes in southern California (RareFind 3.1 2006). It’s occurrence in the GND may be very infrequent or accidental as has been observed and reported only one time.

Literature cited

Arnnet, R. H. 2000.

Ferris, C.D. 2005.

NatureServe. 2005.

RareFind 3.1. 2006. (CDF&G 2004).

Gnorimoschemine Moths — ***Gnorimoschema bacchariselloides*** *and* ***Gnorimoschema ericoidesi***

Status

Two new species of moths in the genus *Gnorimoschema* were described from specimens first collected (termed holotypes or type specimens) from GND habitats; they are here considered to be of local interest. Neither of these species has any recognized special status with federal, state or local agencies or special interest groups. However, the range of these *Gnoriomoschema* species appears to be limited to the GND (Powell and Povolny 2001).

Habitat and occurrence within the Guadalupe-Nipomo Dunes

Information presented below on all *Gnorimoschema* species is entirely from Powell and Povolny (2001).

Gnorimoschema bacchariselloides: type specimen was collected from Oso Flaco Lake in October 1972; other adult specimens were collected in September 1972. No host plant or further biology is known for this new species. *G. bacchariselloides* is a sister species of *G. baccharisella*, which has a distribution along the coast and inland from north of San Francisco to Santa Barbara Co. and several of the Channel Islands. The larvae of *G. baccharisella*, and presumably *G. bacchariselloides* given its' close taxonomic similarity, cause hard stem galls on coyote bush, *Baccharis pilularis*.

Gnorimoschema ericoidesi: Type specimen was collected in June 1973 from Oso Flaco Lake. Flying adults were taken diurnally in association with *Haplopappu*s [*Ericameri*a] *ericoides* in May, June and July. This species, however, was not found a few miles north at Dune Lakes, where the more widely distributed congeneric (i.e. in the same genus) moth *G. ericameriae* occurs on the same hostplant.

Habitat in other areas

Neither species is known to occur outside of the GND. As indicated above, *G. ericoidesi* may even have a very limited distribution within the GND.

Present status within the Guadalupe-Nipomo Dunes

Oso Flaco Lake, the type locality of *G. bacharisellоides*, was severely perturbed from off road vehicle activity by 1972, and Powell and Polovny (2001) imply that the status of this species in the GND is similar to that of *G. ericoidesi* as described below.

The type locality of *Gnorimoschema ericoidesi* at Oso Flaco Lake was gradually destroyed by off road vehicle activity during 1966-1977 (Powell 1981) and although vehicles have been excluded from the area since 1982 and habitat restoration enacted (Powell 1991), *G. ericoidesi* has not been observed since 1973.

Life history

Gnorimoschema bacharisselloides. The salient aspects of the life history are assumed here to be similar to the sister species *G. bacharisella* where eggs are laid on the peripheral branches of the coyote bush to overwinter. Newly hatched larvae burrow into the growing terminal tip, and a gall forms around the larvae by February. Galls are full size (18-36 mm) by late February or March; many, if not most, of them are parasitized by wasps. At maturity, the larva bores out of the gall and drops to the ground for pupation. Emergence takes place in August and September. There is a single annual generation; adults are nocturnal.

Gnorimoschema ericoidesi. Although *G. ericoidesi* and *G. ericameriae* are similar species in that they both occur in the GND and their larvae use the same host plant (*Ericameria ericoides*), *G. ericoidesi* appears, in details of its anatomy, to be more closely related to the *G. baccharisella* group of species. However, since the species use the same larval host plant, the pertinent aspects of the life history of *G. ericoides* may be, and is assumed here to be, similar to that of the more wide spread (San Francisco Co. to Los Angeles Co.) congener *G. ericameriae*. *G. ericameriae* cause small, onion dome-shaped hollow gall-like deformities of the terminal tips of *E. ericoides* that appear to be shaped more like the staves of a barrel than a typical gall growth. Larvae skeltonize the plant material within this shelter and drop to the ground to pupate. Adults emerge in July and August with one generation per year.

Plant associations of larvae of other species of gnorimoschemine moths in GND (after Powell and Polovny 2001).

Seven species of gnoriomochemine moths comprising three genera are represented in the GND. *Gnorimoschema* spp. larvae in the GND feed primarily on species of Asteraceae in the genera *Ambrosia*, *Baccharis*, *Ericamera*, *Gnaphalium*, and perhaps *Hazardia*, *Isocoma* and *Haplopappus*. Many produce stem or tip galls. *Euscrobiopalpa* spp. larvae feed on foliage or inflorescences of Chenopodiaceae or Asteraceae including *Atriplex* and *Artemesia*, respectively. *Scrobipalpula* spp. larvae are all herbaceous tip borers in Asteraceae, especially *Gnaphalium*, and perhaps also in the Rosaceae genus *Horkelia*.

Potential effects of invasive plant species control methods

Unknown. However, based on our limited understanding of their life history and ecology, the larvae are not likely to be affected by current invasive plant control methods as they appear to be associated exclusively with native plants. Herbicides or controlled burns may cause incidental adult mortality, but the limited extent of treatments are unlikely to measurably affect the populations of these moths given the large areas unaffected by invasive weeds compared to treatment areas.

Literature cited

Powell, J.A. and D. Povolny. 2001.

Powell, J.A. 1981.

Powell, J.A. 1991.

Morro blue butterfly ***Icaricia icarioies moroensis***

Status

Federal and state species of concern; listed as an element in RareFind 3.1 (2006).

Habitat and occurrence within the Guadalupe-Nipomo Dunes

The Morro blue is associated with *Lupinus chamissonis* in dune habitats (Emmel and Emmel 1973).

Habitat in other areas

Occupies coastal sand dunes in San Luis Obispo and western Santa Barbara Counties in association with the larval food plant *Lupinus chamissonis* and in inland chaparral areas where this plant occurs. It has also been found on *Lupinus* spp. in an abandoned lemon grove in San Luis Obispo Co. (NatureServe 2005).

Present status within the Guadalupe-Nipomo Dunes

Their status is currently unknown in the GND. Emmel and Emmel (1973) stated that the "strongest remaining population of Morro blue butterflies seems to be at Oso Flaco dunes in San Luis Obispo County" due to the destruction of the type locality in Morro Bay by dune-buggy traffic and, "in part, by the nuclear power plant there". The presence and abundance of the larval host plant, which the adults are also attracted to, suggests that this butter fly is still present in the GND, although their abundance is unknown.

Life history

Larval and adult life stages of Morro blues are associated with dune lupine (*L. chammisonis*), an abundant plant species in the GND. Adults feed on the nectar of lupines, among other plants, mate and lay their eggs on its leaves and flowers (Murphy 1988). They are very like *I. icarioides eviusl*, another subspecies in southern California, in that the larvae feed for about a month on the leaves and flowers and then overwinter as half-grown larvae to emerge the following spring. They pupate for a few weeks in the litter at the base of the lupine and emerge to fly in April to June, with males appearing first (Emmel and Emmel 1973).

Recent synonyms

The Morro blue butterfly was identified as a distinct subspecies in 1929 and described under the name *Plebejus icarioides moroensis* (Sternitsky 1930) and are still recognized by some authors as in the genus *Plebejus* (Brock and Kaufman 2003; Opler and Warren 2003) where the species (no subspecies identified) are called Boisduval's blue.

Potential effects of invasive plant species control methods

Morro blues are expected to still occur in unknown numbers within the GND. Similar to other butterflies, they may be more common in some areas of the GND than others and, even though *Lupinus chammisonis* is present in some areas, the Morro blue may not be. There is no indication that these butterflies have any association with the invasive grass species other than perhaps to rest on them. They may, however, nectar on the ice plant species. If herbicides used for control of the invasive species are applied specifically to the target plants, according to the current GND procedures, overspray onto native *Lupinus* species and other native vegetation will be minimized. As always, care should be taken when applying herbicides to iceplant species so that any butterflies using the flowers are not sprayed.

Literature cited

Brock, J., and K. Kaufman. 2003.

Emmel, T. and J. Emmel. 1973.

Murphy, D.D. 1988.

NatureServe. 2005.

Opler, P., and A. Warren. 2003.

RareFind 3.1. 2006. (CDF&G 2004).

Sternitsky, R. 1930.

Elegant Lithariapteryx — *Lithariapteryx elegans*

Status

Lithariapteryx elegans is a species of local concern. The type specimen was collected from Oso Flaco Lake and its distribution is apparently restricted to beach foredune habitats with collections limited to a few sites in Monterey and San Luis Obispo Counties (Powell 1991).

Habitat and occurrence within the Guadalupe-Nipomo Dunes

The following information regarding *L. elegans* is entirely from Powell (1991). *L. elegans* occur primarily in sandy habitats in close association with the larval food plants *Abronia* (sand verbena) and *Mirabilis* (four o'clocks). It is almost exclusively an insect associate of beach foredune communities and depends upon *A. latifolia*, an active sand dune invader, in areas of active sand but uses *A. umbellata* on stabilized sand where is grows near *A. latifolia*. Adult moths may nectar on *Mesembryanthemum* (*Carpobrotu*s) and *Eriophyllum* growing interspersed with *Abronia* on beach dunes.

Habitat in other areas

L. elegans is found in the same habitat throughout its known range from Monterey Co. to the GND in San Luis Obispo Co.,

Present status within the Guadalupe-Nipomo Dunes

The current status within the GND is unknown. *L. elegans*, along with some possibly GND endemic species, has not been reported in 20 or more years (Powell, pers. comm.2004). Following is from Powell (1991):

> The type locality consisted of chaparral covered stabilized dunes in the 1960's and *Abronia latifolia* in the vicinity presumably was limited to foredunes to the west. With increasing ORV activity, extensive sand roads and active sand invaded the Oso Flaco Lake area by 1971; the active sand gradually increased its takeover of dune vegetation during 1971-77 (Powell 1981), when *A. latifolia* became prevalent and the collections of *Lithariapteryx elegans* were made. In 1980 the California State Park system gained control of the area and beginning in 1982 excluded further ORV activity at the site. By 1987, when only fragments of natural vegetation survived in the active sand dunes where *L. elegans* lived in the 1970's, a revegetation project was initiated by planting two species of native grasses. The exclusion of vehicular traffic and the planting/irrigation project evidently provided sufficient stabilization that, despite four successive dry years, colonization by a variety of native plants has been successful, including *Abronia latifolia* and *A. umbellata*. Hence, we can expect survival of *L. elegans* at the type locality.

Life history

Tiny diurnal moths with forewings adorned with gemlike rounded tufts of shining silver-colored scales. Adults are diurnal and are encountered on sunny days perching and mating on the larval food plant. On windblown coastal dunes they are often found on the sand nearby where they resemble the small jumping spiders (Salticidae) common in dune habitats. A moth viewed in this situation from behind, the bulging metallic colored spots on the wings resemble the eyes of a salticid.

Larvae mine the subsucculent leaves of *Abronia* and *Mirabilis*. Typical mines are bloch-like at the base of the leaf with radiating feeding tunnels. A larva moves to another leaf after mining about half the leaf contents. Frass is ejected from a hole basally in the mine; a mine in sand verbena is evidenced by a gob of silk webbing caked with sand on the underside of the leaf. Pupation takes 14 to 30 days. Coastal populations are multivoltine (more than one generation per year), with adults of *L. elegans* present from March through October.

Potential effects of invasive plant species control methods

In the foredunes, a potential threat to his moth is direct herbicide application to them while they are on iceplant flowers, used occasionally as a nectar source. Direct herbicide application may cause direct mortality or incapacitate them, making them vulnerable to capture by potential predators. In their preferred adult habitat of open sand and in their larval food plants, these moths should not be affected by current weed control methods.

Literature cited

Powell, J.A. 1978.

Powell, J.A. 1991.

Powell, J. Various e-mails. 2004.

Oso Flaco patch butterfly ***Thessalia leanira elegans***

This subspecies of checkerspot butterfly has been recognized as distinctive and collected from dune habitat around Oso Flaco Lake since the 1970's (Priestaf and Emmel 1998). It was formally described in 1998 (Priestaf and Emmel 1998). There is some confusion with its taxonomy, however, and several names have been used for it. RareFind 3.1 (2006) terms the Oso Flaco patch butterfly as *Chlosyne leanira elegans* and the U. S. Fish and Wildlife Service use the name *Chlosyne leanira osoflaco* when they designated this butterfly as a candidate species for formal listing (EPA 1994). Butterflies in the genus *Thessalia* are commonly called checkerspots while members in the genus *Chlosyne* are called patch butterflies (Glassberg 2001). Based on this, it would seem a more accurate common name for *T. leanira elegans* would be the Oso Flaco checkerspot butterfly.

Status

Thessalia leanira elegans is a federal and state species of concern and is listed as an element in RareFind 3.1 (2006).

Habitat and occurrence within the Guadalupe-Nipomo Dunes

This subspecies is known only from Pismo Beach, along the immediate coast, south to Mussel Rock in Santa Barbara County (Priestaf and Emmel 1998; RareFind 3.1 2006). Larval host plants are the various species of Indian paintbrush in the genus *Castilleja*. Adult checkerspots use a variety of plants as nectar sources including: *Erigonium parvifolium*, *Abronia umbellata*, *Erysimum insulare suffrutescens*, *Lotus scoparius,* *Lupinus chamissonis, Castilleja affinis, Corethrogyne filaginfolia,* and *Haplopappus ericoides* (Priestaf and Emmel 1998).

Habitat in other areas

This subspecies is known only from the GND.

Present status within the Guadalupe-Nipomo Dunes

Unknown but assumed to still be present.

Life history

Specific natural history of the Oso Flaco patch butterfly is not known other than that given above. However, the salient aspects of its life history are assumed to be similar to other checkerspots. Research on checkerspot butterflies has been conducted virtually uninterrupted in the western US for 35 years (Mattoni et al. 1997). The following account of the general aspects of the ecology and life history of *Euphydryas*, a checkerspot closely related to the Oso Flaco patch butterfly (Wahlberg et al. 2005), is from Murphy et al. (2004).

Adult checkerspots live for several weeks and usually fly from late February into late spring/early summer. They feed actively on nectar from many plant species as described above for the Oso Flaco area. Mating may involve “hilltopping” where males and females congregate on ridges in areas with topographic relief. Adults may also “puddle”, or gather at sites of standing water during drought conditions. Shortly after mating, females deposit eggs on a host plant selected as an individual plant rather than a plant species. Eggs are laid in clusters of up to 200 and several clusters may be deposited. Larvae hatch in 7-10 days, live in groups typically under a silken web, feeding on the host plant and generally not moving to other plants. Host plants for other checkerspots are generally in the families Asteraceae, Acanthaceae, Scrophulariaceae, and Plantaginaceae.

Larvae feed for weeks or months until the usually dry summertime weather in central coastal California causes the plants to senesce. Larvae then enter a diapause stage and emerge when host plants germinate at the start of the late autumn rainy season. Postdiapause larvae feed for a period of several weeks to months then pupate, usually among low plants near the ground or in leaf litter. Pupae mature and adults emerge in 10 days to two weeks. In natural populations, the life cycle of checkerspots is one year.

Checkerspots, and most other lepidopterans, have a very complex relationship with their host plants. Several studies on other checkerspots with limited distribution similar to the Oso Flaco patch butterfly have shed light on the various natural and anthropogenic factors that affect the long term viability of these populations (Mattoni et al. 1997; Fleishman et al. 2000; Ehrlich and Hanski 2004). Most of these factors center on the relationship between the larvae and the host plants and the manner in which their survivorship is affected by host plant micro-climate, plant selection by females, timing of ovideposition, large scale weather cycles, timing of rains, adult nectar sources, integrity of cryptobiotic crusts, and larval predation. Anthropogenic factors include habitat conversion/destruction by non-native invasive grasses and real estate development, destructive grazing practices (although some grazing schemes can be beneficial to checkerspots), and fire. Mattoni et al. (1997) state that human impacts were almost always involved in local (checkerspot) extirpations in southern California.

Recent synonyms

The Oso Flaco patch butterfly is one of nine recognized subspecies of *Thessalia leanira* (Austin and Smith 1998). By comparison, Edith's checkerspot, *Euphydrayas editha*, has 21 recognized subspecies in California (Murphy et al. 2004) and even this is a fairly small number of subspecies. The numbers of subspecies illustrates how the taxonomy of these butterflies can be fairly complicated and subject to periodic review and reclassification. This problem is addressed by Murphy et al. (2004):

> Like most other butterflies, checkerspots tend to be rather sedentary and as a result show substantial geographic variation as they respond genetically and phenotypically to local conditions. Much of this variation has been described taxonomically in the form of named subspecies. But subspecies usually have little biological significance because they are based on arbitrarily selected characters that are not consistently correlated with other characters. Some named subspecies, which we refer to as "ecotypes", comprise suites of populations that occur in ecologically similar circumstances and exhibit similar patterns of habitat choice and oviposition host plant use. Other subspecies may contain several ecotypes. Conversely, where subspecies have been named from wing pattern only, a single ecotype may contain populations assigned to several subspecies.

Based on this, whether the Oso Flaco patch butterfly is a subspecies as described by Priestaf and Emmel (1998) or in fact an ecotype is academic. The form known as the Oso Flaco patch butterfly, by whatever scientific name, is formally recognized as a special-status species by both federal and state governments.

Potential effects of invasive plant species control methods

With the exception of the conversion of native vegetation to non-native grasslands, the list of anthropogenic (man-made) factors (above) known to be detrimental to checkerspots butterflies in southern California are of little concern in the GND. Carefully controlled burns of beach grass and perhaps areas of thick veldt grass should not cause appreciable, if any, harm to the Oso Flaco patch butterfly. Direct Roundup® application to the eggs of the karner blue butterfly did not cause a reduction in hatching success compared to a control group (Sucoff, Nichols and Lu 2001). Therefore, Oso Flaco patch butterfly egg mortality may be similarly negligible in the unlikely circumstance where the Oso Flaco patch butterfly eggs on a target species are contacted by Roundup®. Adults, not known to associate directly with the targeted invasive species, may nectar on ice plants. Careful observation of the target plant prior to herbicide application should prevent any accidental spraying of any butterfly species.

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RareFind 3.1. 2006. (CDF&G 2004).

Sucoff, E, T. Nichols and E-Y Lu. 2001.

Wahlberg, N., A. Brower, and S. Nylin. 2005.

Schlinger's robberfly *Ablautus schlingeri*

Status

Prior to 2004, Schlinger's robberfly, *Ablautus schlingeri*, was considered a species of special concern by the State of California and as a federal species of concern. Although *A. schlingeri* is not listed in the August 2004 edition of California animals of special concern, it is listed as an element in RareFind 3.1. 2006. The University of California Berkeley Essig Museum of Entomology places this species in a category to be considered for formal listing by the state of California.

Habitat and occurrence within the Guadalupe-Nipomo Dunes

The type specimens of *Ablautus schlingeri* were collected from "Oso Flaco Lake" in 1959, "Oceano sand dunes" in 1962 and "1 mile N of Oceano" in 1965 (Wilcox 1966). Specific plant associations or preferred habitat types within the GND are unknown for *A. schlingeri*. *A. schlingeri* is one of 13 species of *Ablautus* described (Arnett 2000).

Habitat in other areas

Not reported from areas outside of the GND. *A. schlingeri* is assumed to be endemic to the GND.

Present status within the Guadalupe-Nipomo Dunes

Unknown but presumed to still be present within the GND.

Life history

No specific information is available for *A. schlingeri*. However, pertinent aspects of the life history of *A. schlingeri* are assumed to be similar to that of other robberflies within the genus *Ablautus* and similar in the broader aspects to other members of the robber fly family (Asilidae).

Wilcox (1968) states that flies of this genus range from 5 to 11 mm in length, are white or grey and very bristly. They are usually found in sandy areas from February to May but some species are collected only in the summer and others only in the fall. The range of known *Ablautus* species is from Sonora and Baja California, Mexico north to Washington state and east to Texas.

Robberflies are relatively large, fairly common, and occur in a variety of habitats. Most robber fly species have restricted ecological requirements and may therefore be locally distributed (Arnett 2000). Adults are predaceous, taking prey, usually other insects, on the wing and often attacking insects larger than itself (Borror and White 1970). They are opportunistic predators and feed on any insect they can capture (Cannings 1998). Prey are killed with paralyzing saliva and the liquefied contents of the prey are sucked out (Wood 1981 *in* Cannings 1998). Robberflies hunt in bright, open areas and are most active in the warmest parts of the day; overcast conditions greatly reduce their activity (Cannings 1998). Larvae occur in loose soil, under bark or fallen leaves, or decaying wood and are predaceous on larvae of other insects. Flies may overwinter as larvae with a 2 to 6 week pupal stage; in warmer regions many species probably live for one year (Cannings 1998).

Potential effects of invasive plant species control methods

Determination of if or how robberflies may be affected by current weed control methods is difficult due to the lack of specific life history and natural history information. To speculate, it seems that there would be little detrimental effects to adults on warm, sunny days as they would probably fly off. On colder, overcast days adults may be somewhat more lethargic but whether they rest on the target species is unknown. However, even if they did and were inadvertently sprayed with a herbicide, it is unknown whether this would cause direct mortality to this robust insect although its flying and prey capture abilities could be compromised. Any negative impacts to this species, however, are likely to be very localized and temporary and be out-weighed by reestablishment of native vegetation in the formerly weed impacted areas.

Literature cited

Arnett, R. 2000.

Borror, D., and R. White. 1970.

Cannings, R. 1998.

RareFind 3.1. 2006. (CDF&G 2004).

Wilcox, J. 1966.

The following two species have not been observed in the GND, although their occurrence in GND habitats seems likely.

Sand Dune Tabanid Fly ***Brennania hera***

Sandy Beach Tabanid fly ***Apatolestes actites***

Status

Two tabanid fly species, the sand dune tabanid, *Brennania hera*, and the sandy beach tabanid, *Apatolestes actites*, are of local interest but lack special-species status with state or federal agencies or with any special interest group. Powell (1981) lists *B. hera* as an example of an insect species endemic to coastal dunes and *A. actites* is unusual in its habitat selection of sandy beaches along a limited range of the California coast (Middlekauff and Lane 1980). Middlekauff and Lane (1980) mention these species together as examples of an unusual habitat for tabanids, that is psammohilous (sand loving) in a marine influenced environment. Most other tabanids are aquatic or semi-aquatic, living in ponds, marshes, or other moist environments although some species are known from fairly dry habitats (Powell and Hogue 1979).

Habitat and occurrence within the Guadalupe-Nipomo Dunes

Neither of these tabanid flies, also known as horse or deer flies, is documented as occurring in the GND. However, both flies occur in habitats similar to those in the GND at locations both to the north and to the south. Both have been documented at Montana de Oro in San Luis Obispo Co. (Middlekauff and Lane 1980). It is likely that the GND was not surveyed during the Middlekauff and Lane (1980) surveys. The one other described species of *Brennania* (*B. belkini*) is an endemic species of a small remnant coastal sand dune community in southern California and is a state special status species (RareFind 3.1. 2006).

Habitat in other areas

The following information is from Middlekauff and Lane (1980).

B. hera: Sand dune tabanid flies occur in costal sand dunes from Marin County to San Miguel Island in Santa Barbara County. Larvae burrow 20 to 32 cm deep in slightly damp sand. Immature *B. hera* were most abundant in sandy areas on gradual slopes bordered by plants such as *Grindelia stricta, Lupinus arboreus, Eriogonum latifolium* and *Mesembranthemum (Carpobrotus) chilensis.* Specific habitat is not given for adults.

P. actites: The geographical range of sandy beach tabanid flies is from Marin County to Santa Barbara County. Adults were collected on sandy beaches below high water mark in clumps of beach wrack. Larvae were found on open sandy beaches in the supralittoral zone (i.e., above the intertidal zone but occasionally wetted by large waves and salt spray) at a depth of 8 to 13 cm in slightly damp sand.

<u>Present status within the Guadalupe-Nipomo Dunes</u>

Neither tabanid fly species is documented as occurring in the GND. However, the presence of both species is strongly suspected based on their distribution in similar habitats both north and south of the GND.

<u>Life history</u>

The following information is from Middlekauff and Lane (1980).

Adult *Apatolestes* are large, to 17 mm, grayish black, with shaggy whitish hair. B. hera females are about 14 mm length and yellowish brown. The anatomy of both suggests the females are bloodsuckers. Both seem to be active in the summer from June through August in the northern portion of their ranges.

Flies develop from eggs to larvae, called maggots, to a pupal stage from which they emerge as adults. Given the size and developmental stage of larvae of *P. actites*, they may overwinter at least twice before attaining maturity. Presumably, *B. hera* complete their life cycle in one year. Adults of both species apparently remain near by to potential breeding sites.

Most adult female tabanids feed on vertebrate blood, generally that of large mammals but also birds, lizards and turtles. Males and some females feed on nectar and plant exudates. Most are diurnal feeders. Both *B. hera* and *P. actites* are notable among tabanids in that they are active under both cool and windy conditions. Adult *P. actites* fly readily when disturbed, moving rapidly and close to the sand.

While the open sandy beach habitat of *P. actites* is markedly depauperate in potential prey species, the sand dune habitat of *B. hera* contains a wide variety of potential prey species.

<u>Potential effects of invasive plant species control methods</u>

Unknown. However, it seems reasonable to assume that given the burrowing nature of the larvae of both species that they would be little affected by herbicides currently used as weed control methods. Nor would they likely be affected by controlled burns since they appear to occupy barren sandy areas. Adults appear as though they would fly off readily and rapidly when disturbed.

<u>Literature cited</u>

Middlekauff, W. and R. Lane. 1980.

Powell, J.A. and C. L. Hogue. 1979.

4.0 AMPHIBIANS

4.1 Findings

Guadalupe-Nipomo Dunes amphibians are represented by only eight confirmed frog, toad, and salamander species (Table 4-1; Appendix B). None of the confirmed amphibian species are GND endemics. Appendix B presents the habitat relationships of confirmed taxa and the references confirming their presence in the GND. The low number of known amphibian species is likely due to the limited number of surveys within the GND, with the possible exception of studies within the Guadalupe Oil Field (Smith et al. 1976; Dames & Moore 1979; Burton and Kutilek 1991; Kutilek; Shellhammer; and Bros 1991; Entrix Inc. 1996; and Unocal 1999-2004). An additional four other species are mentioned in the literature as possibly occurring in the GND but their presence has not been confirmed (Table 4-1; Appendix B).

AMPHIBIANS CONFIRMED TO OCCUR IN THE GND		
Scientific Name	**Common Name**	**Status**
Aneides lugubris	Arboreal salamander	
Ensatina eschscholtzii	Ensatina	
Batrachoseps nigriventris	Black-bellied slender salamander	
Spea hammondii	Western Spadefoot toad	CDFG species of concern
Bufo boreas	Western toad	IUCN red listed
Hyla regilla	Pacific tree frog	
Rana aurora draytonii	California red-legged frog	Federally threatened
Rana catesbeiana	Bullfrog	
AMPHIBIANS SUSPECTED OF OCCURRING IN THE GND BUT PRESENCE UNCONFIRMED		
Ambystoma californiense	California tiger salamander	Federally endangered - SB Co.
Taricha torosa	California newt	CDFG species of special concern
Rana boylii	Foothill yellow-legged frog	CDFG & USFS species of concern
Bufo californicus	Arroyo toad	Federally endangered

Table 4.1 Amphibians confirmed and unconfirmed in the GND and their designation as special–status species.

4.2 Habitat associations

A unique adaptation of the amphibians is their ability to live, interchangeably, in wet and dry habitats. Although many forms are aquatic and completely dependent upon open water sources throughout their life, some survive in drier habitats underground. Many amphibians, although primarily terrestrial as juveniles and adults, require water for swimming larval stages to complete their life cycle.

In the Guadalupe-Nipomo Dunes, over 1,200 acres (Smith et al. 1976) of open water in dune lakes, freshwater marshes, creeks, and swales provide habitat for the eight confirmed amphibians.

Sandy beach and active sand

Few amphibians venture close to the GND shoreline. Only the western toad has been observed in these habitats (Unocal 1999-2004). Toads have thicker (generally bumpy or warty) skin than frogs and a greater ability to resist desiccation. They often travel far from sources of water. They are nocturnal, roaming overland looking for insects, because the daytime heat would dry them out. During the day, they hide under logs, boards, rocks, burrows of their own construction, or in rodent burrows. The often foggy, overcast, and humid weather at the GND allow toads to move further distances into “drier” habitats.

Foredune and dune swale

Western spadefoot toad, western toad, pacific tree frog, and California red-legged frogs have all been confirmed in GND foredune and dune swale habitats (Entrix Inc. 1996; Unocal 1999-2004). In addition, ensatina is suspected to occur in dune swale (Smith et al. 1976). Surface water in dune swales can be semi-permanent or permanent. When sufficient rainfall occurs to dampen or fill the swales, amphibians find moisture, food, and cover. If there is standing water, they may lay eggs that hatch and metamorphose before the waters dry up (about 3 months for Pacific tree frogs, 4–5 months for California red-legged frogs, and 6 months for western toads). These species reproduce faster than the larger predatory bullfrogs whose tadpoles require an over-wintering period before metamorphosis. Once metamorphosis is complete or conditions change, the frogs and toads can move to better cover, possibly in riparian habitats.

Coastal dune scrub

Eight amphibian species confirmed in the GND have been found in coastal dune scrub habitats (Unocal 1999-2004). Much of the GND is covered with coastal dune scrub. In the Oceano Dunes SVRA much of the area is bare sand. A few wildlife habitats remain as isolated vegetated islands protected from vehicle encounters. Amphibians were found on only one of these islands (Kutilek et al. 1991). The western toad, California red-legged frog, and Pacific tree frog were occasionally seen in coastal dune scrub habitats in the GOF (Unocal 1999-2004).

Wetland

All eight confirmed salamander, frog, and toad species were located in wetland habitats within the GND with the Pacific tree frog being the most common. The Pacific tree frog is active both day and night (Stebbins 2003). Despite its “tree frog” connotation, this frog is chiefly a ground-dweller, living among shrubs and grass near water. Its large toe pads allow it to climb easily, and cling to twigs or grass. The Pacific tree frog eats a wide variety of arthropods.

Riparian

The western toad, Pacific tree frog, and California red-legged frog, plus all three confirmed salamander species, were reported in riparian habitat. Riparian areas generally have a high wildlife value, supporting a disproportionate number of wildlife when compared to upland habitats (Brode and Bury 1984 cited in USACE 1998). Although the value of riparian areas for some wildlife is well documented, relatively little work has been done on the importance of riparian areas for amphibians and reptiles (Szaro and Belfit 1986). Because of their frequent association with aquatic habitats, there is little doubt that riparian habitats are especially important to amphibians. In California, riparian areas provide habitat for 83% of amphibian species and 40% of reptile species (Brode and Bury 1984).

4.3 Special amphibian considerations

Over the last several decades, considerable concern exists for the populations of amphibians throughout the world. Dozens of species have vanished entirely and others are becoming harder to find. In Yosemite National Park in California, for example, three of the seven native frog and toad species are gone while the populations of the remaining four species are declining. Among the several factors responsible are destruction of amphibian habitats and those factors associated with global warming including widespread and local climate changes and thinning of the ozone layer. Frogs absorb water directly through their skin and are especially vulnerable to water pollutants like pesticides and acid rain.

Probably more consequential to the health and well being of amphibians in the GND than herbicide spraying to control invasive plants, is contamination from agricultural runoff. U.S. Geological Survey biologists have confirmed that agricultural contaminants may be an important factor in amphibian declines in California (USGS 2000). USGS scientists showed that pesticides are being absorbed by frogs in both aquatic and terrestrial systems and are suppressing the enzyme cholinesterase, which is essential for the proper functioning of the nervous system. Modern-day pesticides bind with this enzyme in animals, disrupt nervous system activity, and cause death by respiratory failure. Decreased cholinesterase activity can indicate exposure to certain commonly used pesticides (USGS 2000).

Research conducted by the Central Coast Regional Water Quality Control Board in the Santa Maria River watershed has measured elevated levels of DDT and dieldrin in sediments, plus aldrin, chlordane, DDT, dieldrin, and toxaphene in tissues of fish (CCRWQCB 2005). Specific to the GND, organic chemicals were detected in Arroyo Grande Creek and Santa Maria River estuaries. These sites had elevated levels of DDD, DDE, and DDT. Santa Maria River Estuary also had elevated levels of dieldrin and endrin. Toxic Substances Monitoring Program data found DDT levels at the Santa Maria Estuary at an extremely high level (>900 µg/kg) in fish tissue from a single sampling event in 1992. Bay Protection and Toxic Cleanup Program also found elevated levels of DDT and dieldrin in Santa Maria River estuary sediments and high toxicity (>60%; CCRWQCB 1998).

Davidson et al. (2002) studied 237 historic California red-legged frog locations and found population declines associated with the percentage of upland agricultural land use. They suggest that wind-borne agrochemicals have had a detrimental impact on these populations. On September 19, 2005, the EPA was ordered to study the impact of pesticides on California red-legged frogs. The EPA must consult with the USFWS to determine if 66 of the most toxic and persistent pesticides are impacting California red-legged frogs.

Potential effects of invasive plant species control methods

Fusilade (FLUAZIFOP-P-BUTYL) is used to kill invasive grass species in all but the Federal lands in the GND. The herbicide works by inhibiting lipid synthesis. It is degraded by microbial metabolism (Tu et al. 2001) and the half-life in soils is one to two weeks. It strongly binds with soils, so is not likely to contaminate water by runoff. Once in water, fusilade is hydrolyzed into fluazifop acid, which is stable in water (Tu et al. 2001). Fusilade is slightly toxic to birds and mammals but is highly toxic to fish and aquatic invertebrates (Tu et al. 2001).

Glyphosate is used in the GND to control weed species by inhibiting the synthesis of certain amino acids needed for growth (Tu et al. 2001). Like fusilade, glyphosate strongly binds to soil particles, which limits contamination from runoff. However, glyphosate has a long half-life, from two weeks to several years, with an average half-life of two months (Tu et al. 2001). Once in water, glyphosate half-life is shortened to 12 days to ten weeks because it binds to sediments.

Glyphosate itself is relatively non-toxic to birds, mammals, and fish. However, when certain surfactants are added to glyphosate, it becomes highly toxic to aquatic species (Tu et al. 2001). Documented damage to animals from Rodeo occurs when toxic surfactants are added. When glyphosate is sold as Rodeo, which has no surfactant, it is safe to use in aquatic environments. Rodeo is moderately toxic to aquatic species because it is rapidly dissipated (Tu et al. 2001). Only glyphosate without surfactants is used around wetlands in the GND.

From information contained in literature, from the manufacturer and a few studies conducted by private researchers, it appears that using the recommended amounts of glyphosate around wetlands should have minimal impact to amphibians. However, extreme caution should be used when using glyphosate around water sources because future studies might show an impact from glyphosate use, as most studies have been done with glyphosate containing surfactants, not without.

Another factor to consider when using glyphosate near wetlands is the cumulative impact when combined with surrounding GND agricultural practices that contribute unknown amounts of herbicides and pesticides to GND waterways through drift or runoff. Future studies should monitor GND waterways to determine where, when, and in what amounts herbicides and pesticides are entering the GND.

<u>Introduced species</u>

Several authors over the past 30 years have observed bullfrogs in the GND. In the 1970s, Smith et al. (1976) believed that the numbers of this predatory amphibian was low because it was just recently introduced, but that they may increase in numbers, especially in the Dune Lakes. A few years later, Dames & Moore (1979) noted that breeding bullfrogs were common in the GOF wetlands. In the early 1990s, bullfrogs were observed 75% of the time in time-constrained searches of the Union Oil property (Kutilek et al. 1991). Burton and Kutilek (1991) determined bullfrogs to be rare (perhaps only one or two individuals) in the Oso Flaco Lake and Oceano Dunes SVRA in 1990 and 1991. The low density of frogs at that time corresponded to a long drought. In recent years, researchers at the Guadalupe Oil Field site noted a small number of bullfrogs in a marsh pond, which they eliminated. Recent heavy rainfall (winters of 2004–2005 and 2005–2006) may provide long-standing surface water bodies that will promote bullfrog reproduction.

<u>Literature cited</u>

Brode, J. and R.B. Bury.1984.

Central Coast Regional Water Quality Control Board (CCRWQCB). 1998.

Central Coast Regional Water Quality Control Board (CCRWQCB). 2005.

Davidson, C., H.B. Shaffer, and M.R. Jennings. 2002.

Stebbins, R.C. 2003.

Szaro, R.C. and S.C. Belfit. 1986.

Tu, M., C. Hurd, and J. Randall. 2001.

Unocal. 1999-2004.

US Army Corps of Engineers (USACE). 1998.

USGS. 2000. (U.S. Geological Survey)

4.4 Amphibian special-status species accounts

Following are brief accounts of the biology of amphibian special-status species confirmed to occur in the GND. An attempt was made to make them relevant to GND considerations. Much more information is available on many of the species, especially those that are federally listed. The species accounts are based on the references provided at the end of each account.

Western spadefoot toad *Spea hammondii*

The western Spadefoot toad, *Spea hammondii*, ranges in size from 1.5 to 2.5 inches in length. Their coloration can be green, brown, yellow, or gray with irregular light stripes and random darker blotches. The skin of this toad is relatively smooth with scattered small tubercles, red or orange tipped in some individuals; the coloration of the belly is whitish. The body of the western spadefoot toad is plump with short limbs, the eyes are large with vertical pupils, and the eardrum is apparent. The most distinguishing characteristic of this species is the prominent sharp-edged "spade" on each hind foot (Morey 2004a).

<u>Status</u>

The western spadefoot toad was designated a species of special concern by the State of California in 1994 and is listed as sensitive by the BLM (Morey 2004a).

<u>Habitat and occurrence within the GND</u>

Few western spadefoot toads have been reported in surveys conducted in the dunes (Smith et al. 1976). When they were seen, Unocal (1999-2004) observed these toads in a wide variety of habitats within the GOF.

<u>Habitat in other areas</u>

The western spadefoot toad primarily frequents washes, floodplains of rivers, alluvial fans, and alkali flats, but also ranges into the foothills and mountain valleys. They prefer areas with short grasses where the soil is sandy or gravelly (Stebbins 2003).

<u>Present status within the GND</u>

The population appears to be steady with low to moderate abundance.

Life history

Spadefoot toads are strictly nocturnal. Most of the year (daylight hours and long dry periods) is spent in deep, almost vertical burrows that can be up to 36 inches deep. Toads use the spades on their hind feet to construct burrows but may also occupy abandoned mammal burrows. During dry periods, the moist burrow provides water for absorption through the skin. On warm, moist nights during the summer they emerge to feed. Adult toads are generally sit-and-wait predators and consume insects, worms, and other terrestrial invertebrates.

Other than during the breeding season, the adults do not move around much. Most surface movements by adults are associated with rains or high humidity at night. Breeding usually occurs during the spring with the onset of the first heavy rains. Females lay their eggs in thick bands, containing 10–42 eggs, around the stems of water plants or on the upper surfaces of small-submerged rocks. The eggs hatch in as little as one and one-half days (Morey 2004a).

Feeding tadpoles sometimes swim around in large aggregations creating whirlpools, which stirs up plankton and organic material from the bottom of the pool. This material is filtered out as water is passed over their gills and consumed. Tadpoles are also carnivorous, consuming dead larvae of amphibians, including their own species. Recently metamorphosed juveniles seek refuge in the immediate vicinities of breeding ponds hiding in drying mud cracks, under boards, and other surface objects, which may include decomposing cow dung (Morey 2004a). Wading birds or raccoons may heavily prey upon dense populations of tadpoles.

Western spadefoot toad special considerations

Habitat protection is the primary strategy for conserving the western spadefoot toad. The principal factors contributing to the decline of the western spadefoot toad are habitat loss and/or fragmentation due to urban development and conversion of native habitats to agricultural lands. These changes in habitat result in populations that are small and increasingly isolated, reducing movements by individuals and, thereby, reducing genetic exchange between populations. Small populations are more likely to go extinct due to catastrophic or stochastic events. Isolation reduces the potential for recolonization of areas where toads have disappeared. To complete its life cycle, the species needs appropriate aquatic habitats as well as adjacent upland habitats.

Activities that produce low frequency noise and vibration in or near habitat for western spadefoot toads may be detrimental to the species. They are extremely sensitive to such stimuli, which cause them to break dormancy and emerge from their burrows, resulting in mortality or reduced productivity.

Distribution / Collections

The western spadefoot toad ranges throughout the Central Valley and adjacent foothills from sea level to 1,363 m (4,500 ft) in the southern Sierra foothills. It is usually in high densities where it does occur, but is rapidly losing breeding ground to land development.

Recent synonyms

Former taxonomic classification: *Scaphiopus hammondi*

Literature cited

Morey, S. 2004a.

Stebbins, R.C. 2003.

Western toad *Bufo boreas*

Western toads, *Bufo boreas*, are relatively large and robust with dry, warty skin. Skin coloration is greenish, tan, reddish brown, or dusky gray, and yellow above. Warts are often rusty colored and set on dark blotches. Males are usually less blotched than females and have smoother skin. Male and female throats are pale. Adults have a light-colored dorsal stripe but young toads lack this stripe immediately after transformation (Morey 2004b). Oval parotoid glands are prominent between the eyes when viewed from above and the pupils are horizontal. This toad moves by walking, instead of hopping.

The GND local subspecies is called the California toad (*Bufo boreas halophilus*).

Status

The International Union for Conservation of Nature and Natural Resources (IUCN) red listed Western toads in Category and Criteria EN A1ce in 1996. This listing code, assessed by the World Conservation Monitoring Centre, translates to: ENDANGERED (EN). In the U.S. western toads are not listed as federally endangered or threatened or as a State species of concern.

Widely distributed in California, *B. boreas* is becoming uncommon in many areas of the Pacific Northwest, the Rocky Mountains and other areas; probably due to environmental changes caused by habitat loss (especially wetlands).

Habitat and occurrence within the GND

Within the GND, western toads have been found in dune swale, coastal dune scrub, riverine, wetland, and riparian habitats (Entrix Inc. 1996, Burton and Kutilek 1991; Kutilek et al. 1991).

Habitat in other areas

Western toads frequent a wide variety of habitats such as, desert streams, grasslands, woodlands, mountain meadows, and can be found in or near a variety of water bodies. Throughout its range, the western toad may be locally abundant, depending on habitat quality.

Present status within the GND

Although western toads have been reported in many of the wildlife surveys conducted in the dunes, their abundance appears to be low.

Life history

Western toads are an explosive breeder. Females deposit thousands of eggs in long strings, usually in shallow ponds. During the winter, *B. boreas* buries itself in loose soil or uses the burrow of a small mammal. Both males and females lack an advertisement call although they are known to have a release call.

Western toads are nocturnally active but are occasionally seen moving about in daylight or resting at the edge of breeding pools during the breeding season. Adults eat a variety of terrestrial insects, other small arthropods and, less commonly, earthworms, snails, and slugs. Tadpoles filter suspended plant materials and tiny planktonic organisms from water, or feed on bottom detritus.

Literature cited

Morey, S. 2004b.

California red-legged frog *Rana aurora draytonii*

The California red-legged frog (CLRF) is the largest native frog in the western United States, ranging in size from 4 to 13 cm (1.5 to 5 inches) not including their legs. These are the celebrated jumping frogs of the California gold rush lore.

Status

The California red-legged frog is a federally threatened species.

Habitat and occurrence within the GND

Researchers studying wildlife in the GND have found California red-legged frogs (CRLF) in wetland, riparian and dune swale habitats. Kutilek et al. (1991) reports CRLF from Coreopsis and Oso Flaco Lakes. In the Guadalupe Oil Field, CRLF were observed in the Santa Maria River and in ponds (Entrix Inc. 1996; Dames & Moore 1979). Unocal (1999-2004) conducted surveys for CRLF during construction and restoration work at

GOF and reported that frogs were common in wetlands but uncommon in riparian habitats, and rare in foredunes, coastal dune scrub, dune swale, and rivers.

CDFG (2004a) RareFind 3.1 database reports California red-legged frogs, 0.6 miles northeast of the mouth of the Santa Maria river, 7 miles south of Oceano [Pt. Sal quadrangle], at the southwest end of Little Oso Flaco Lake in 1998, and Oso Flaco Creek, 3.5 miles north of Guadalupe in 2002 [Oceano quadrangle].

During GOF restoration, Unocal placed small radio transmitters on six frogs, relocating them from a drainage pond where they were at risk, and monitored their movements. The frogs returned to their native sites (Unocal 1999-2004).

<u>Habitat in other areas</u>

Habitats of California red-legged frogs are characterized by dense, shrubby riparian vegetation associated with deep (2 ft), still or slow-moving water (Jennings and Hayes 1994). Shrubby vegetation preferred by California red-legged frogs is arroyo willow (*Salix lasiolepis*); cattails (*Typha* sp.) and bulrushes (*Scirpus* sp.) found in wetland and riparian habitats. Water with a salinity of less than 4.5 % is necessary to ensure the survival of embryonic stages. Juvenile frogs seem to favor open, shallow aquatic habitats with dense submergent vegetation.

Although California red-legged frogs rely on aquatic systems, they can be encountered far from water under specific environmental circumstances and particularly in the spring and fall. Recent studies have shown that they may disperse more than two miles to or from a breeding site, usually in response to winter rains or seasonal drying of their water source (USFWS 2001a). Radio tagging studies in the GND support this ability to traverse long distances (Unocal 1999-2004).

In Marin County, California red-legged frogs use ponds or pools for breeding during the wet season (December through March), and ponds or pools, logjams, and root tangles during the rest of the year (Fellers and Guscio 2004). Dispersal from breeding sites is highly variable. Some frogs remain at breeding ponds all year, while others spend only a few days. Frogs at sites that hold water only seasonally are forced to disperse, but they often remain until the site is nearly completely dry. In areas of heavy summer fog, frogs can disperse throughout the summer with little risk of desiccation. Fellers and Guscio (2004) found that frogs moved to dense riparian vegetation associated with a permanent creek less than 150 m (about 500 ft) away. Along the riparian corridor, the most commonly used cover included blackberry thickets, logjams, and root tangles at the base of standing or fallen trees.

<u>Present status within the GND</u>

California red-legged frogs have been well documented in most wildlife survey accounts in the GND. Dames & Moore (1979) reported breeding in marsh-grassland habitat located in the Guadalupe Oil Field. Data from CRLF eye-shine reconnaissance surveys at the GOF, demonstrate the changing population size of these frogs (Unocal 1999-2004). Data from GOF suggests the populations of CRLF are persistent and can be locally abundant at times but experience changes in survival rates associated with environmental conditions.

Life history

California red-legged frogs breed from late November to late April. Males appear at breeding sites from 2-4 weeks before females where they may form groups of 3–7 individuals that call to attract females. Females move toward male calling groups and amplex (embrace) a male. Following breeding, females attach egg masses containing approximately 2,000 to 6,000 eggs to emergent vegetation (e.g. cattails, bulrush). Tadpole larvae require 4–5 months to attain metamorphosis (July to September) during which time they are thought to be algal grazers, but their foraging ecology is unknown. Larvae apparently spend most of their time concealed in submergent vegetation or organic debris. Working at the GOF, independent consultants have recognized that some CRLF tadpoles overwinter.

Sexually maturity can be attained by 2 years for males and 3 years for females but may not reproduce until they are 3 and 4 years of age, respectively (Jennings and Hayes 1994). California red-legged frogs may live 10 years (Fellers and Guscio 2004).

Adult California red-legged frogs do not appear to migrate large distances from their aquatic habitat, although they are known to make pronounced seasonal movements within their local aquatic and terrestrial habitats. During periods of high water flow, California red-legged frogs are rarely observed and while where they go during this interval is not well understood, at least some individuals have been observed concealed in pockets or small mammal burrows beneath banks stabilized by shrubby riparian growth. More research is needed to understand the movement ecology of *R. a. draytonii*.

Post-metamorphs have a highly variable animal food diet. Most prey that can be swallowed and are not distasteful, are eaten with larger frogs capable of taking larger prey. Frogs and small mammal prey may contribute significantly to the diet of adults and subadults. Adult frogs may use vibrations transmitted along willow branch runways to detect approaching small mammal prey.

In general, adult frogs are quite wary. Highly nocturnal, adults appear to face frequent attempts at predation by wading birds (e.g., black-crowned night herons, *Nycticorax nycticorax*, American bitterns, *Botaurus lentiginosus*). Adult frogs seem to sense vibrations to detect the approach of predators such as raccoons. Juveniles (< 60-65 mm) are much less wary, are frequently active diurnally, and spend much of the daytime hours basking in the vegetation of the warm, surface-water layer where they can fall prey to predators such as two-striped garter snakes (*Thamnophis hammondii*).

California red-legged frog special considerations

The California red-legged frog has been extirpated from over 70 percent of its former range and now survives in fewer than 250 streams in central coastal California. It is threatened by a wide variety of impacts including the destruction, degradation, and fragmentation of habitat, introduction of non-native predators, such as bullfrogs, crayfish, and certain species of fish, and even historical over-exploitation of the species by humans (Sanders 2004). CRLF are suspected of being particularly sensitive to changes in water quality due to a variety of factors (e.g., various herbicides and pesticides, sulfate ions) that have not been examined specifically for their effects on the developmental stages.

Frog breeding and tadpole survival rates are impacted by changes in withdrawals of surface and groundwater that modify existing flow regimes, allowing ponds and pools to dry out before tadpole metamorphosis (Fellers and Guscio 2004). Overgrazing can also impact population survival because grazing and similar land use practices are especially effective at reducing or eliminating the dense riparian cover required by California red-legged frogs. Some researchers suggest that total protection of entire local hydrographic basins may, ultimately, be the only way to protect some of the remaining populations.

The US Fish and Wildlife Service developed goals for the protection and recovery of the California red-legged frog. USFWS believes that these goals can best be accomplished by a region-specific approach to conservation that preserves, restores, and manages lands that support a variety of habitat types that sustain the frog.

Predation and disease

The decline of the once-abundant California red-legged frog has been linked to the widespread introduction of mosquito fish (*Gambusia affinis affinis*) as biological control agents for mosquito larvae in wetlands (Lawler et al. 1999 cited in Dykstra 2004). There is also evidence that the decline of the CRLF has been influenced by the escape and spread of introduced bullfrogs from frog farms in western North America (Hayes and Jennings 1986). Lawler et al. (1999) found that survival of CRLF larvae in the presence of bullfrog tadpoles was 5% compared to 34% in control ponds, and that the presence of mosquito fish did not affect tadpole survival directly, but caused lower average weight at metamorphosis and increased probability of injury.

Literature cited.

CDFG. 2004a.

Dykstra, J. 2004.

Fellers G.M. and G. Guscio. 2004.

Hayes, M.P., and M.R. Jennings. 1986.

Jennings M. and M. Hayes. 1994.

Lawler, S. P., D. Dritz, T. Strange, and M. Holyoak. 1999.

Sanders, R. 2004.

USFWS. 2001a.

4.5 Species accounts for unconfirmed amphibian

The following section presents accounts for special-status amphibians that are **not confirmed** to occur in the GND habitats but whose presence has been suggested by various authors of various reports.

California tiger salamander ***Ambystoma californiense***

The presence of California tiger salamanders <u>has not been confirmed</u> in the GND.

The California tiger salamander is most commonly found in annual grassland habitats, but also occur in grassy understory of valley-foothill hardwood habitats, and uncommonly along stream courses in valley-foothill riparian habitats.

<u>Status</u>

California Tiger Salamanders are federally endangered, as of August 2005, only in Santa Barbara and Sonoma Counties.

USFWS (2000, 2002) reviewed the biogeographical and genetic information supporting the recognition of the Santa Barbara County population and Sonoma County population as distinct population segments under the U.S. Endangered Species Act. On 21 September 2000, the Santa Barbara County population was listed as endangered under the U.S. Endangered Species Act. USFWS (2003) proposed threatened status for the Central California population, and reclassified the Santa Barbara and Sonoma County populations from Endangered to Proposed Threatened (Federal Register, 23 May 2003, pp. 28648-28670). On August 19, 2005, this decision was reversed and they were returned to US Endangered Species status.

<u>Habitat and occurrence within Guadalupe-Nipomo Dunes</u>

California tiger salamanders <u>have not been observed</u> in GND habitats. Smith et al. (1976) list the species without confirmation of sightings or habitat preference. Entrix Inc. (1996) lists the California tiger salamander as potentially present in dune swale, riverine, wetland, and riparian habitats.

Habitat in other areas

The habitat of this salamander is restricted to grassland and low foothills, where long lasting breeding vernal pools exist. Permanent aquatic sites can be used for breeding. Dry season habitat sites generally consist of small mammal burrows as well as man-made enclosures. They are likely to retreat into burrows of California ground squirrel and Botta's pocket gopher to avoid dehydration (Kucera 2004; Jennings and Hayes 1994).

Present status within Guadalupe-Nipomo Dunes

The present status of California tiger salamanders in the GND is unknown. Although it is possible that tiger salamanders were once present in the GND, they do not appear to be present today. Focused surveys for tiger salamanders in ponds and rodent burrows near surface water should be conducted to determine if populations from adjunct groups in Santa Barbara County are present in the Dunes.

Unocal (1999-2004) report no sightings of California tiger salamanders during nighttime quarterly surveys conducted for California Red-legged frogs in the GOF.

Life history

California tiger salamanders engage in nocturnal breeding migrations. Movement occurs from dry season refuge sites to the breeding ponds from November to April, though most commonly from December to March. These migrations occur after the ground has become moist, because the breeding pools do not form until the soil is saturated from the autumn and winter rains. Males precede females to the breeding sites, and males often outnumber females. Shortly after breeding, the adults vacate the ponds. Eggs are deposited singly or in small groups in the relatively shallow depths of the temporary pools. A minimum of 10 weeks is required for complete development, including metamorphosis (Kucera 2004). A generalist with respect to terrestrial habitats, their reproduction is highly dependent on fishless (i.e., seasonal) bodies of water.

Tiger salamander special considerations

Like many other amphibians in central California, this species has suffered from habitat loss and may be experiencing the initial stages of habitat fragmentation (Fisher and Shaffer 1996). Another threat is the introduction of predatory fishes, such as mosquito fish, in use today as a method of mosquito control. California tiger salamanders appear to have been adversely affected by the 1986–1990 California drought, which lead to a decrease in suitable breeding habitat (LaMonte and Mahoney 2004).

This unique California endemic is the most vulnerable of the group of amphibians that breed in rain pools because its long developmental interval appears to restrict its ability to reach metamorphosis in only those rain pools that are the longest lasting, and as a consequence, often the largest in size. USFWS (2002) reported that the lifetime reproductive success of California tiger salamander is low. While individuals may survive for more than 10 years, they may breed only once, and, in some populations, less than 5 percent of juveniles survive to become breeding adults. This low productivity can result in roughly 11 metamorphic offspring over the lifetime of a female. Even so, in the central California, the species still occurs throughout most of the historical range and remains locally common in some areas.

Literature cited

Fisher, R. N., and H. Shaffer. 1996.

Jennings, M. and M. Hayes. 1994.

Kucera, T. 2004.

LaMonte, G. and M. Mahoney. 2004.

USFWS. 2000. (U.S. Fish and Wildlife Service).

USFWS. 2002. (U.S. Fish and Wildlife Service).

USFWS. 2003a. (U.S. Fish and Wildlife Service).

California newt ***Taricha torosa***

The California newt, *Taricha torosa*, is a large salamander between five and eight inches in total length (SDNHM 2007). They are reddish brown on the dorsal side with an orange belly (SDNHM 2007). They have large eyes with light-colored lower eyelids (Peterson 2003). The larvae are small and have a large tailfin (SDNHM 2007).

Status

The California newt is a CDFG species of special concern.

Habitat and occurrence within Guadalupe-Nipomo Dunes

Population status unknown at this time. Occurs near wetland areas.

Habitat in other areas

California newts occur in coastal mountain ranges from San Diego to northern California (SDNHM 2007). During late summer and fall months they live out of the water, hiding under rocks and logs (SDNHM 2007). The rest of year they can be found in pool habitats.

Present status within Guadalupe-Nipomo Dunes

Unknown at this time.

Life history

California newts are a toxic salamander. There are poisonous toxins which can cause death to predators (SDNHM 2007). After handling a California newt, it is recommended that you wash your hands (SDNHM 2007).

Literature cited

Stebbins. R. 2003.

San Diego Natural History Museum (SDNHM). 2007.

Foothill yellow-legged frog ***Rana boylii***

Foothill yellow-legged frogs have not been observed in GND habitats.

Once common and fairly abundant, *R. boylii* was historically distributed throughout the foothill portions of most drainages from the Oregon border to the San Gabriel River (Los Angeles Co.).

Status

Federal: None
State: Amphibian Species of Special Concern in California
IUCN (Red List) Status: Near threatened.

Habitat and occurrence within the GND

Foothill yellow-legged frogs have not been observed in the GND. Smith et al. (1976) list the species without confirmation of sightings or habitat preference. We tentatively place this unconfirmed species as possibly occurring in wetland habitats.

Habitat in other areas

Rana boylii require shallow, flowing water, preferentially in small to moderate-sized streams with some cobble-sized substrate (Hayes and Jennings 1988, Jennings 1988). Foothill yellow-legged frogs have been found in streams lacking a cobble or larger-sized substrate (Fitch 1938; Zweifel 1955), but it is not clear whether such habitats are regularly utilized (Hayes and Jennings 1988). Suitable habitat includes riparian/riverine corridors, wetlands, and wetland/upland mosaics in which wetland patches are separated by less than 1 km of upland habitat. Foothill yellow-legged frogs are infrequent or absent in habitats where introduced aquatic predators (i.e., various fishes and bullfrogs) are present (Hayes and Jennings 1988; Kupferberg 1996), probably because their aquatic developmental stages are susceptible to such predators.

Present status within the GND

The presence of *Rana boylii* has not been confirmed in the GND. Its occurrence is based on a single report by Smith et al. (1976), which lacked any references to support the claim that this species occurs in the area.

Life history

Little is known about the life history of this frog. Foothill yellow-legged frogs are aquatic, diurnally active amphibians, spending most or all of their life in or near streams although they have been documented underground and beneath surface objects more than 50 m from water. When threatened, these frogs dive to the bottom and hide in rocks or litter. They are rarely vocal.

Breeding occurs from mid-March until early June when streams have slowed from winter runoff. Clusters of 300-1,200 eggs are attached to the downstream side of submerged rocks over which a relatively thin, gentle flow of water exists. Newly hatched tadpoles seem to be capable of growing much more rapidly on epiphytic diatoms than other types of algae, and have been observed to preferentially graze on this algal type. Approximately two years are required to reach adult size (Storer 1925), but no data are available on longevity.

Post-metamorphs probably eat both aquatic and terrestrial insects, but few dietary data exist for this species. Several subspecies of garter snakes feed on the post-hatching stages of *R. boylii*. Rough-skin newts prey on the eggs of *R. boylii*.

Foothill yellow-legged frog special considerations

Foothill yellow-legged frogs have disappeared in 45 percent of their range in California. Populations south of southern Monterey County are now apparently extinct partly due to high water conditions, estimated to be of 500-year frequency, which occurred over much the area during the spring of 1969 (Sweet 1983).

Davidson et al. (2002) found evidence that airborne agrochemicals have played a significant role in their decline; habitat destruction, climate change, and UV-B radiation also appear to be contributing factors in the decline of this species.

They are a species of special concern in the Coast Ranges north of the Salinas River where they still occur at many localities, some of which harbor significant numbers of frogs. Nevertheless, even in this area, *R. boylii* are at risk due to the exotic predatory aquatic fauna that is increasing its range in this region, poorly timed water releases from upstream reservoirs that scour egg masses from their oviposition substrates, and decreased waterflows that can force adult frogs to move into permanent pools where they may be more susceptible to predation (Hayes and Jennings 1988).

Literature cited

Davidson, C., H. B. Shaffer, and M. Jennings. 2002.

Fitch, H. 1938.

Hayes, M. P. and M. R. Jennings. 1988.

Jennings, M. R. 1988.

Kupferberg, S.J. 1996.

Storer, T. I. 1925.

Sweet, S. 1983.

Zweifel, R. G. 1955.

Southwestern arroyo toad ***Bufo californicus***

Status

Federal: Endangered
State: Amphibian Species of Special Concern in California
IUCN (Red List) Status: Near threatened

Little information is available on the year-round activities of both sexes and definitive movement characteristics.

Habitat and occurrence within the GND

B. californicus has not been documented in the GND. Entrix, Inc. (1996) suggested these toads might be found in dune swale, riverine, wetlands or riparian habitats. Presence of these toads has not been corroborated by later studies.

Habitat in other areas

Southwestern arroyo toads occur in sandy, stable terraces along stream banks, with scattered shrubs and trees, such as mulefat (*Baccharis salicifolia*) and willow (*Salix* spp.). When breeding, they prefer open pools with gravel or sandy bottoms found near large streams. Adults need fine sand to burrow into over winter.

Southwestern arroyo toads are found in foothill canyons and inter-mountain valleys where the river is bordered by low hills and the stream gradient is low (Miller and Miller 1936, Sweet 1992). They are extreme habitat specialists, restricted to riparian environments in the middle reaches of third order streams (Sweet 1989). Southwestern arroyo toads are known to either breed, forage, and/or aestivate in aquatic habitats, riparian, coastal sage scrub, oak, and chaparral habitats. The species is currently thought to be restricted to the headwaters of large streams with persistent water from March to mid-June that have shallow, gravely pools less than 18 inches deep, and adjacent sandy terraces. Upland burrows have been noted for this species. Patterns of habitat use by sub-adults and non-breeding adults are not well understood (Sweet 1992).

Breeding pools must be open and shallow with minimal current, and with a sand or pea gravel substrate overlain with sand or flocculent silt (Sweet 1989). Adjacent banks must provide open, sandy or gravely terraces with very little herbaceous cover for adult and juvenile foraging areas, within a moderate riparian canopy of cottonwood, willow, or oak. Heavily shaded pools are unsuitable for larvae and juvenile toads due to lower water and soil temperatures and poor algal mat development (Sweet 1992). Episodic flooding is critical to keep the low terraces relatively vegetation free. Juveniles favor areas that remain damp and contain less than 10% cover, as these sites possess the thermal and refuge characteristics required for juvenile survival and rapid growth (Sweet 1992). Larval growth appears to be more rapid in pools with low silt loads (Jennings and Hayes 1994). Adults use terraces in the 100-year flood zone, which may extend up to 100 m from the stream (Campbell et al. 1996); however, data that is more recent suggests that they may move between 1 and 2 km into adjacent upland habitats to estivate. Most terraces are not immediately adjacent to the stream, but are separated by a dynamic, channel margin zone of mixed sediments, which is reworked as storm waters flood the primary channel (Campbell et al. 1996). Drainages with straighter courses will have broader marginal zones and fewer terraces but may have associated oak flats that provide suitable adult habitat (Campbell et al. 1996).

Life history

Adult toads are primarily nocturnal, but may be diurnal during breeding season. Newly metamorphosed toads are active during the daylight hours and can tolerate much higher temperatures than can adults (Mayhew 1968). Adults of this species are active at ambient temperatures between 22-35° C (72-95° F) (Brattstrom 1963 cited in Simon 2005).

Larvae feed by inserting their head into the substrate and ingesting loose organic material such as interstitial algae, bacteria, and diatoms. They do not forage on macroscopic vegetation (Sweet 1992, Jennings and Hayes 1994, USFWS 1999). Post-metamorphose (juvenile) toads rely on ants (USFWS 1999) almost exclusively. By the time they reach 17 to 23 mm in length, they take more beetles along with the ants (Sweet 1992, USFWS 1999). Adult toads probably consume a wide variety of insects and arthropods including ants, beetles, spiders, larvae, caterpillars, and others.

Southwestern arroyo toad special considerations

A recovery plan has been prepared by the U.S. Fish and Wildlife Service (USFWS1999), which outlines the status and life history of the toad, recovery goals and tasks, and an implementation schedule. The following information was obtained from the University of California at Riverside Western Riverside County Multiple Species Habitat Conservation Plan (UCR 2005).

Threats to the species include loss of sandy streambank habitat, siltation of breeding pools, and predation by introduced species such as bullfrog, crayfish, green sunfish, and bullhead catfish.

The southwestern arroyo toad has been extirpated from 75 percent of its former range (USFWS 1994), however since the listing of the southwestern arroyo toad, numerous new locations have been located through site-specific surveys. Although a substantial proportion of currently occupied habitat is found on National Forest lands, recovery of southwestern arroyo toads on privately owned lands will likely be necessary for recovery of the species. Toad habitat requirements and habitat loss may act in concert to functionally isolate populations (Campbell et al. 1996). The remaining habitats are threatened by dam construction, river diversion, conversion of riparian wetland habitat by agriculture and urbanization, road construction, off-highway vehicle use, campground development, grazing, and mining activities.

Artificial flows from dam releases from February though August encourages vegetative growth in riparian corridors, and disrupts the natural fluvial processes that produce the terrace pool habitats required by southwestern arroyo toads (Sweet 1992). Currents of five cm/sec or greater are sufficient to displace eggs and embryos/larvae up to 82 hours post hatching (Sweet 1992). Sedimentation sources also negatively impact southwestern arroyo toad habitat, and therefore, should be monitored and controlled (Sweet 1992). Off-road vehicle use in streambeds and along banks cause significant impacts to southwestern arroyo toads. Introduced plants and predators can cause substantial reductions in the size of populations, and may have contributed to regional extinctions of southwestern arroyo toads (Hayes and Jennings 1986). Predatory fish, such as introduced mosquito fish and arroyo chub, that prey on tadpoles, are found in virtually all occupied and previously occupied streams (Sweet 1992), and introduced bullfrogs which prey on adult southwestern arroyo toads are encouraged by artificially maintained perennial streams (Sweet 1993).

Distribution / collections

Southwestern arroyo toads were once common in coastal river and stream systems from San Luis Obispo County to Rio Santo Domingo in Baja California Norte, Mexico. They are currently reduced to one quarter of their historic range; the species was federally listed as endangered in 1994. In southern California, they are primarily found in undisturbed streams in the national forests.

Subspecies

Formerly *Bufo microscaphus californicus*.

Literature cited

Brattstrom, B.H. 1963.

Campbell, L. et al. 1996.

Jennings, M.R., and M.P. Hayes. 1994.

Mayhew, W.W. 1968.

Miller, L., and A.H. Miller. 1936.

Simon, M. 2005.

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USFWS. 1994. (U.S. Fish and Wildlife Service).

USFWS. 1999. (U.S. Fish and Wildlife Service).

University of California Riverside (UCR). 2005.

5.0 REPTILES

5.1 Introduction

Reptiles, the snakes, lizards, turtles, and tortoises, are often lumped with amphibians in faunal associations as herpetofauna. Reptiles are generally thought of as inhabitants of dry, arid areas such as deserts, whereas amphibians are associated with wetlands or other aquatic systems. Unlike amphibians, reptiles are generally oviparous although some are ovoviviparous or viviparous.

Except for the Guadalupe Oil Field, there have been few surveys in the GND for reptiles. Reptile species information for the GND is mainly based on the reports of Smith et al. 1976; Dames & Moore 1979; Burton and Kutilek 1991; Kutilek et al. 1991; Entrix Inc. 1996; and Unocal 1999-2004.

5.2 Findings

GND reptile species are represented by 21 confirmed species; four of these are special-status species (Table 5.1). None of the confirmed reptile species are GND endemics. Appendix C presents the habitat relationships of confirmed reptile taxa in the GND and the reference sources.

In addition to the 21 confirmed species, five additional taxa may be present but their presence in the GND is currently unconfirmed. These taxa are presented in Table 5.2 and Appendix C.

Scientific name	Common name	Legal status
Turtles		
Clemmys marmorata pallida	Southwestern pond turtle	SC
Side-blotched and horned lizards		
Phymosoma coronatum frontale	California horned lizard	FSC, SC
Sceloporus occidentalis	Western fence lizard	
Uta stansburiana	Side-blotched lizard	
Skinks		
Eumeces skiltonianus	Skilton's skink	
Whiptails		
Aspidoscelis tigris mundus	California whiptail	
Alligator lizards		
Elgaria multicarinata	Southern alligator lizard	
Legless lizards		
Anniella pulchra pulchra	Silvery legless lizard	FSC, SC
Colubrids		
Diadophis punctatus	Ringneck snake	
Coluber constrictor mormon	Western yellow-bellied racer	
Masticophis flagellum	Coachwhip snake	

Masticophis lateralis	Striped racer (California whipsnake)	
M. lateralis lateralis	Chaparral whipsnake	
Pituophis catenifer	Gopher snake	
P. catenifer annectens	San Diego gopher snake	
Lampropeltis getula	Common kingsnake	
Thamnophis elegans	Western terrestrial garter snake	
T. hammondii	Two-striped garter snake	SC
T. atratus atratus	Aquatic garter snake	
T. sirtalis	Common garter snake	
Vipers		
Crotalus oreganus	Western rattlesnake	

Table 5.1 Reptiles species confirmed to be in the GND

Scientific name	Common name	Legal status
Side-blotched and horned lizards		
Scleporus occidentalis biseratus	Great Basin fence lizard	
S. occidentalis occidentalis	Northwestern fence lizard	
Colubrids		
Contia tenus	Sharp-tailed snake	
Pituophis catenifer catenifer	Pacific gopher snake	
Hypsiglena torquata	Night snake (spotted)	

SC CDFG Species of Special Concern
FSC Federal Species of Concern, Sacramento Office

Table 5.2 Reptile species suspected to occur in the GND

5.3 Habitat associations

Reptile species in the GND have been found mainly in dune swale and coastal dune scrub habitats. The following sections briefly describe the different habitat types and the type of reptiles that have been found in them.

Sandy beach, active sand, foredune, and dune strand

Few reptiles have been observed in open sand areas or the dune strand; only the California whiptail and special-status species of California horned lizard and silvery legless lizard (Unocal 1999-2004). The California horned lizard is diurnal and when threatened may spray a predator with blood from the corners of its eyes. The silvery legless lizard is nocturnal and buries itself in sand or leaf litter to hunt insects. Western fence lizard, two-striped garter snake, and side-blotched lizard have been observed in foredune habitats (Unocal 1999-2004).

Taxonomy of the California whiptail, *Cnemidophorus tigris mundus*, has been recently revised to *Aspidoscelis tigris munda* (CalifornaHerps 2006). Whiptail's forage by digging and probing for insects, grubs, termites, scorpions, centipedes, and other small animals, including small lizards, some which are apparently detected by odor and dug out of the ground (Stebbins 2003). In the GND, Smith et al. (1976) and Unocal (1999-2004) report this whiptail subspecies in beach/dune strand, dune swale, and coastal dune scrub habitats.

Dune swale and coastal dune scrub

All species of confirmed reptiles have been reported to occur in dune swale and coastal dune scrub habitats in the GND; these habitats provide cover (usually vegetation or rocks) where southern alligator and western fence lizard can hide from predators. Western rattlesnakes may also occur in dune scrub habitats but prefer rocky outcroppings and ledges near water.

Coachwhip snakes, *Masticophis flagellum*, occur in open terrain and are most abundant in grass, scrub, chaparral, and pasture habitats where they seek cover in rodent burrows, bushes, trees, and rock piles (Palermo R052). Coachwhips are often found near roads (Stebbins 2003) and this is where a dead specimen was found in the GOF (Unocal 1999-2004).

Whipsnakes found in the GND were reported from coastal dune scrub habitats by Smith et al. (1976), Entrix, Inc. (1996), and Unocal (1999-2004). In the GND, whipsnakes are represented by the striped racer (or California whipsnake (*Masticophis lateralis*) and its subspecies chaparral whipsnake (*M. lateralis lateralis*). Typically, the species prefers mixed chaparral, chamise-redshank chaparral, and valley-foothill riparian habitats (Stebbins 2003).

Side-blotched lizards are insectivorous and commonly observed in the GND. Within its wide range, side-blotched lizards are typically seen on rocks, the lower branches of shrubs, in debris near the ground, usually with cover nearby. It frequents highly disturbed areas.

Wetlands and riparian

In wetland habitats researchers in the GND have observed western terrestrial, two-striped, aquatic, and common garter snakes (Smith et al. 1976, Dames & Moore 1979, Unocal 1999-2004). Garter snakes use riparian vegetation as cover while they hunt prey. Western fence and southern alligator lizards are also found in these habitats where they climb bushes to hunt insects or other small prey (Smith et al. 1976). Silvery legless lizards were found by Dames & Moore (1979) and Unocal (1999-2004) in wetland habitats.

Oso Flaco Lake

Various studies have documented southwestern pond turtles, gopher snakes, western rattlesnake, southern alligator lizard, western fence lizards, California horned toad, and silvery legless lizards around Oso Flaco Lake.

5.4 Potential effects of invasive weed control methods

Controlled burns and herbicide application are the two invasive weed control methods that may impact reptiles in the GND. However, while the extent of any impacts is not known, it may reasonably be expected to be small when two factors are considered. First, the area of the GND treated compared to the untreated areas is relatively small since about 10 percent of the GND is affected by the invasive weeds, not all of which are treated in any given year. Second, controlled burns are not commonly used and when they are, they impact a relatively small area and are usually restricted to dense stands of European beach grass. High mortality can probably be assumed for any reptiles in these beach grass stands during a control burn.

Literature cited

California Herps. 2006.

Palermo, L. R052.

Stebbins. 2003.

5.5 Special-Status Species

There are no known federally threatened or endangered reptile species in the GND. The four special-status species known to occur in the GND are: southwestern pond turtle, California horned lizard, silvery legless lizard, and two-striped garter snake. Species accounts are presented for these special-status species. These accounts present a brief description of the species status, known or suspected occurrence in the GND and in which habitat, pertinent aspects of its life history, and any information relevant to its susceptibility to impacts from current invasive weed control method.

5.6 Reptile special-status species accounts

Following are accounts for the special-status reptile species known to occur in the GND.

Southwestern pond turtle ***Clemmys marmorata pallida***

Status

The southwestern pond turtle is a CDFG species of special concern.

Habitat and occurrence within the GND

Southwestern pond turtles were common and abundant at Oso Flaco Lake in the early 1990's (Burton and Kutilek 1991). At the GOF, southwestern pond turtles have been found in marsh ponds located along the Santa Maria River channel (Unocal 1999-2004). It is likely that they occur in many of the permanent lakes within the GND.

Habitat in other areas

This species is found primarily in permanent aquatic habitats, such as small lakes, small ponds, and slow moving permanent or intermittent streams with shallow pools, ephemeral shallow wetlands, stock ponds and sewage treatment lagoons throughout its range from the southern end of the San Francisco Bay south into northern Baja California, Mexico.

Present status within the GND

Southwestern pond turtles are relatively common in aquatic habitats in the GND. The status of their populations is unknown however. Burton and Kutilek (1991) suggested that drought was a significant factor affecting the distribution and abundance of GND reptiles and amphibians.

Life history

In the summer, females lay 8 to 10 eggs in nests along the sandy banks of slow moving streams and ponds, usually above the high water mark. However, it is common for females to use upland habitats, sometimes one or two hundred meters from water (Ashton et al. 1997b) for suitable nest sites. Nest sites require soil at least 4 inches deep with a relatively high internal humidity for eggs to develop and hatch properly. Upland nest sites will generally have a southern exposure and short grass vegetation, if any (Ashton et al. 1997b). Hatchlings from upland sites then make the journey overland to the nearby water.

Adults may either migrate down waterways or over terrestrial habitats. Daily movements along watercourses may be up to 1000 meters or more. Distances of terrestrial movements are on the scale of several hundred meters but may be up to 3.1 miles (Ashton et al.1997b).

Basking sites are required for thermal regulation and an ideal site will allow quick access to deep water at the approach of potential predators. In cold winter climates, they will hibernate in the mud. They may also overwinter in upland areas.

They are an opportunistic and omnivorous species with a diet that includes aquatic plant material, aquatic snails, water beetles, fish, amphibians, carrion and even coyote scat. Juveniles, usually one or so inches in body length at hatching, are preyed upon by bullfrogs, some fish such as bass, and several wading birds. Adults are preyed on by coyotes, red foxes, raccoons, weasels, and dogs (Ashton et al. 1997b).

Potential effects of invasive plant species control methods

Wetland areas of the GND, where southwestern pond turtles have been observed, are not intensively treated for invasive plant species. Upland occurrence and the nature of their movements (timing, habitats traversed/occupied, distance covered, etc.) in the GND are unknown. A study specific to pond turtle ecology in the GND will be necessary to better understand what effect, if any, the current weed control methods may have on southwestern pond turtles in areas away from the wetlands.

Literature cited

Ashton, D.A. Lind, and K. Schlick. 1997b.

California horned lizard ***Phyrnosoma coronatum frontale***

Status

The California horned lizard is a CDFG species of special concern. This genus and species are also termed the coast horned lizard (Stebbins 2003). Endemic to California, this species historically had a scattered distribution from Shasta County southward to Ventura County at elevations from near sea level to almost 2000 m.

Habitat and occurrence within the GND

At the GOF, California horned lizards have been observed in foredunes, beach strand, coastal dune scrub, dune swale, and active sand habitats (Unocal 1999-2004). In light of the wide variety of habitats where they are found throughout their range, coast horned lizards are probably relatively widespread throughout dry GND habitats although they may not be common.

Habitat in other areas

Even in suitable habitat, California horned lizards can be uncommon and their cryptic and secretive nature makes them difficult to find. It may be found in several habitat types ranging from coastal scrub, chamise chaparral, clearings in riparian woodlands, saltbush, annual grassland, non-native grasslands, and oak woodlands. They have been found on lawns and gardens in residential areas (CDFG 2004a). They prefer open, sandy habitats, usually between shrubs and often near ant nests (CDFG 2004a). In Morro Bay, they were located between 'relatively pristine foredunes and backdunes of exotic *Ammophilia arenaria'* [European beach grass] (CDFG 2004a). In Santa Barbara Co., they were found in open sandy areas bordered by coyote bush, poison oak, coast live oak, and grasses (CDFG 2004a). Other plants California horned lizards have been associated with include black sage, California sage, deer weed, coastal buckwheat, tar plant, and mock heather (CDFG 2004a). They have been found in areas that had burned within the past few years.

Present status within the GND

California horned lizards continue to be seen on occasion in the GND and are encountered uncommonly at the GOF (J. Schneider, pers. comm. 2004). No studies have been done to document their population fluctuations over time in the GND, so whether they are relatively stable or increasing or decreasing is unknown. However, considering the relatively large undisturbed areas in the GND, and the fact that the abundance of native ants, their preferred food, has not been compromised by competition with non-native Argentine ants as was the case in one area of San Luis Obispo, (CDFG 2004a), it seems likely that the population of California horned lizards in the GND is at least stable.

Life history

The California horned lizard ranges in size from approximately 6.5 to 10.5 cm. All horned lizards have a flattened oval body shape, head armor or horns, and distinctive fringe scales along the side of the body.

California horned lizards are most active during the spring and fall in the middle of the day when it is warmer and bask in the open during the cooler parts of the day. They often burrow into the sand to escape predators and to avoid extreme heat. During winter hibernation or periods of inactivity, they will burrow into the sand under rocks or logs, or crawl into rock crevices or unoccupied burrows and are mostly inactive except during unusually warm periods.

The reproductive season for this species seems to vary and to be dependent upon local conditions. Generally, eggs are laid in late spring to early summer and hatch about two months later. A clutch of eggs is laid in a nest, constructed by the female, in loose sand.

The most common prey item of horned lizards is ants. Other prey items include beetles, grasshoppers, flies, wasps, and caterpillars. Its many predators include larger lizard species, snakes, loggerhead shrikes (*Lanius ludovicianus*), and raptors.

Potential effects of invasive plant species control methods

Unknown. They could occur fairly close to some invasive weeds, especially if there were a substantial supply of ants nearby. Ingestion of insect prey that had been sprayed by herbicides may be expected to have minor impacts, similar to that documented for birds, as the plant enzyme system affected by the herbicides used in the GND are not present in vertebrates (Tu et al. 2001). Controlled burns would likely kill any California horned lizards in the immediate area, either directly or, to a lesser extent, by the associated vehicular traffic in the burn area. However, this impact would likely be relatively small considering the small area impacted, compared to the much larger area of undisturbed GND habitat for California horned lizards.

Literature cited

CDFG. 2004a.

Stebbins, R. 2003.

Tu et al. 2001.

Silvery legless lizard ***Anniella pulchra pulchra***

Status

The silvery legless lizard is a CDFG species of special concern. It is a small (95-170 mm), limbless fossorial (burrowing) lizard, snake-like in appearance with polished looking silvery gray or beige skin and a yellow belly.

The silvery legless lizard is a subspecies of the California legless lizard (*Anniella pulchra*), an endemic to California and Baja California Norte, Mexico. They range from San Francisco Bay southward along the outer and inner Coast Ranges and Sierra Nevada foothills through the Transverse and Peninsular ranges into Baja California Norte, Mexico.

Habitat and occurrence within the GND

The central coast dunes appear to provide favorable habitat, especially in stabilized dune areas where native coastal shrubs occur, such as lupine (*Lupinus* spp.) and mock heather (*Ericameria ericoides*). It prefers to burrow in sandy or loose loamy soils where it feeds on small insects. It is commonly found in the highly organic, moist soil/leaf litter under a variety of native shrubs, commonly lupine. They occur in most non-aquatic GND habitats from the foredunes to the inland most extent of the dune habitats.

Habitat in other areas

Silvery legless lizards occur in a wide variety of habitats throughout their range. They typically prefer sandy soil with high organic and moisture content, and very often in close proximity with a variety of native plants (CDFG 2004a).

Present status within the GND

Silvery legless lizards are commonly observed in the GND. Their distribution may be patchy, being relatively common in one area at one time and uncommon in other similar habitats (CDFG 2004a.

Life history

Litters of one to four young may be born between early August to November (CDFG 2004a), after a gestation period estimated to be approximately four months in duration. The young grow rapidly (2.5-4.4 mm per month) and reach sexual maturity typically in two to three years. Known predators include several species of snakes, small rodents, domestic cats, and some bird species (e.g. California thrasher and loggerhead shrike).

Their movement through the soil column appears to be influenced primarily by temperature and moisture gradients, however, the presence of a food source (e.g. insects) is likely to be another major influence on where they may be located. Soil moisture serves an important role in conserving energy at high temperatures and allows skin shedding to occur. It is believed that soil moisture may be a limiting factor for portions of their geographic range.

In areas that have been invaded by exotic plant species, such as ice plant (*Carpobrotus edulis* and *Mesembryanthemum crystallinum*), European beach grass (*Ammophila arenaria*), and veldt grass (*Ehrharta calycina*), silvery legless lizards may no longer be able to survive due to resulting alterations in the substrate. Exotic plants support a limited arthropod food base compared to native plant species. Exotic plant species may also change soil characteristics that may either directly or indirectly have negative impacts on this species. For example, some exotics such as ice plant build up the salt concentration in the soil making the substrate physically unsuitable for legless lizards and/or their prey. Another negative impact from exotic plants is a decrease in the soil moisture that is so critical to this lizard (Unocal 1999-2004).

Potential effects of invasive plant species control methods

Unknown. However, impacts, if any, to this lizard from invasive weed control methods may come from herbicide application and controlled burns. Direct herbicide application to the lizard is unlikely as it is generally buried in the soil or leaf litter or under thick undergrowth. Ingestion of insect prey that had been sprayed by herbicides may be expected to have minor impacts, similar to that documented for birds, as the plant enzyme system affected by the herbicides used in the GND are not present in vertebrates (Tu et al. 2001). Silvery legless lizards are susceptible to mortality associated from burns (CDFG 2004a). However, their abundance in the areas likely to be burned to control weeds in the GND is probably low compared to natural areas. Any lizard mortality caused by controlled burns may be expected to be relatively minor relative to their GND-wide population.

A focused survey of the abundance of silvery legless lizards in the areas likely to be burned, i.e. dense stands of European beach grass, would provide some indication of their expected mortality in these habitats from controlled burns.

Literature cited

CDFG. 2004. (California Department of Fish and Game)

Tu, M., C. Hurd, and J. Randall. 2001.

Two-striped garter snake *Thamnophis hammondii*

Status

The two-striped garter snake is a CDFG species of special concern. They are gone from about 40 percent of its former range due in part to the filling of wetlands, loss of riparian habitat, urban development, predation by introduced species (e.g. bullfrogs, fishes, and feral pigs), and losses of amphibian prey. They are found along the Coast and Transverse ranges west to the Pacific Ocean from Monterey Bay south into northwest Baja California, Mexico.

Habitat and occurrence within the GND

In the GOF, two-striped garter snakes have been found rarely in coastal dune scrub and foredune habitats and more commonly in all wetland areas (Unocal 1999-2004).

Habitat in other areas

Two-striped garter snakes are usually found in the immediate vicinity of aquatic habitats that are generally bordered by dense vegetation, such as streams, marshes, ponds, sloughs, and riparian areas. In Santa Barbara County, they have been found in coastal sage scrub (CDFG 2004a). They have also been observed in disturbed wetland areas (trash, choked with non-native vegetation, poor water quality) (CDFG 2004a)..

Present status within the GND

Two-striped garter snakes continue to be observed in the GND, especially in the GOF (Unocal 1999-2004). Whether their population is stable or increasing or decreasing in GND habitats is unknown. However, wetland areas of the GND are for the most part in good condition and generally free from exotic weeds and therefore the population of these snakes may be expected to be at least stable.

Life history

Two-striped garter snakes are typically from 60 to 90 cm. in length. During warm summer days, they are most active in the morning and afternoon, hunting along the vegetated edges of aquatic habitats where they feed on fish and fish eggs, amphibians and amphibian larvae, invertebrates, and occasionally small mammals (Stebbins 2003). In the cooler weather of spring and fall they are active in the warmer afternoons. Small mammal burrows, rock crevices, and rotting logs are used for winter hibernacula or as nocturnal cover during the warmer months. They occasionally emerge from their winter refuge to bask in the sun (J Schneider pers. comm.)

Mating occurs in the spring soon after emergence from their hibernacula. Females give birth to between 1 to 25 live young in late summer or fall in a secluded, well-covered location (Stebbins 2003).

Potential effects of invasive plant species control methods

Unknown, but impacts may be expected to be fairly minor, if any, due to their preference for aquatic and wetland areas that are generally not intensively treated by current weed control measures. Snakes are fairly wary and will generally move off and seek cover when approached, making direct application of herbicide unlikely. Their vertebrate and insect prey items are similarly generally aquatic and unlikely to be affected by herbicides used in the GND.

Literature cited

CDFG. 2004a. (California Department of Fish and Game).

Stebbins, R. 2003.

6.0 BIRDS

This chapter presents information pertaining to confirmed and unconfirmed birds in the GND, along with sections on possible impacts to birds from weed eradication methods, and species accounts of confirmed special-status birds.

Discussions of birds in the GND follows a slight modification of the groupings used by Peterson (1990). This method does not follow systematic or phylogenetic order but uses nine groups based mainly on visual categories and groups together those birds with common habitat requirements. The nine groups are:

- Duck-like birds
- Waterfowl
- Seabirds
- Long-legged wading birds
- Smaller wading birds
- Fowl-like birds
- Raptors, birds of prey
- Non-passerine birds
- Passerines (perching birds)

6.1 Findings

There are 314 confirmed birds in the GND. Appendix D lists the confirmed birds along with the GND habitat types where they were observed, and reference sources. Various authors suspect the presence of another 31 bird species, but they are unconfirmed at this time. Appendix D lists these unconfirmed species and their suspected habitat(s) within the GND.

Many other bird species occur in marine habitats adjacent to and offshore of the GND. Several species of auks (Alcidae), for example, were reported in studies conducted along the shore (Entrix Inc. 1996). We chose not to describe these types of birds here because their interaction with terrestrial habitats in the GND is limited and current restoration activities are not expected to measurably reach beyond the dune strand and therefore have little effect on their foraging activities or social interactions. We report only a few marine species reported along the dune shores and estuarine habitats (Appendix D).

Comparison to other bird studies

The total number of bird species known to be present in the GND is impressive (314 confirmed and 31 unconfirmed species; Appendix D) and compares favorably with other nearby coastal areas known for their rich avian fauna. For example, the total number of birds species identified during the Christmas Bird Census in Morro Bay since it began in 1948 is 312 (www.Morrocoastaudubon.org). In Monterey County, the Elkhorn Slough and adjacent marshland, uplands, and beach habitats support 346 species of resident and migratory birds (www.elkhornslough.org).

Among several explanations for the high number of birds in the GND, two are significant. Of primary significance and importance is the large area of quality terrestrial and aquatic habitat in the dunes, especially important to birds migrating along the Pacific Flyway. Second, many highly respected local “birders”, most of who are involved in the Morro Coast Audubon Society, examine GND habitats regularly for rare birds. GND areas regularly visited by the birders include the Oceano Lagoon and Campground, the mouth of the Santa Maria River and Oso Flaco Lake. Their sightings are posted regularly on their web pages providing a continuously updated record of bird sightings in the GND.

Special-status bird species

Birds selected as special-status bird species satisfied one of two criteria. First, the species was listed as an element and tracked in RareFind 3.1 (2006) or was listed as a California state Special Animal [www.dfg.ca.gov/whdab/pdfs/SPAnimals.pdf] for February 2006, or both. The second criteria were being listed on the Audubon watch list.

A total of 84 species satisfied one or the other or both criteria and are presented in Table 6.1. Special-status species account for 26% of all bird species known to occur in the GND. Species accounts are given for these species in the following sections. An additional 11 bird species suspected of occurring in the GND but which are unconfirmed at this time are special-status species (Appendix D). Species accounts are not provided for these birds.

The formal listing status of these species is not presented. Many species have several listing categories such as Threatened under the federal Endangered Species Act or Endangered under the California Endangered Species Act in addition to being listed by one or more federal or state agencies or national bird conservation groups. Because these designations change over time, for the purpose of this report, their status as a special-status species was assigned a numerical value, termed here as a category, of either 1, 2, or 3, from the most sensitive species to the least sensitive, based on the following criteria.

Category	Criteria
1	Federal or state listing as threatened or endangered; fully protected species by California Department of Fish and Game.
2	Listed as a California species of concern (CSC); listed by U. S. Fish and Wildlife (Sacramento office) as a sensitive species.
3	Audubon watch list; USBC listed; listed as sensitive by the U.S. Forest Service (Reg. 5) or the Bureau of Land Management; or listed by either or both RareFind 3.1 (2006) or California special animals, February 2006 [www.dfg.ca.gov/whdab/pdfs/SPAnimals.pdf].

Based on the above criteria, of the 86 special-status bird species, 14 are Category 1 (most sensitive), 31 are Category 2 (moderately sensitive) and 41 are Category 3 (of some concern) as presented in Table 6.1. Current formal listing status for all but 12 of the species listed in Table 6.1 is on the website for California special animals cited above.

Scientific name	Common name	Status category
Duck-like birds		
Gavia adamsii	Yellow-billed loon	3
Gavia immer	Common loon	2
Phalacrocorax aturitus	Double-crested cormorant	2
Waterfowl		
Aythya valisineria	Canvasback	3
Branta hutchinsii leucopareia	Aleutian cackling goose	1
Dendrocygni bicolor	Fulvous whistling-duck	2
Seabirds		
Brachyramphus marmoratus	Marbled murrelet	1
Chilidonias niger	Black tern	2
Larus atricilla	Laughing gull	3

Larus californicus	California gull	2
Larus heermanni	Heermann's gull	3
Pelicanus erythrorhynchos	White pelican	2
Pelicanus occidentalis californicus	California brown pelican	1
Rhynchops niger	Black skimmer	3
Sterna antillarum browni	California least tern	1
Sterna caspia	Caspian tern	2
Sterna elegans	Elegant tern	2
Sterna forsteri	Forster's tern	3
Long-legged wading birds		
Ardea alba	Great egret	3
Ardea herodias	Great blue heron	3
Botaurus letiginosus	American bittern	3
Egretta thula	Snowy egret	3
Ixobrychus exilis	Least bittern	2
Nycticorax nycticorax	Black-crowned night heron	3
Plegadis chihi	White-faced ibis	2
Smaller wading birds		
Aphriza virgata	Surfbird	3
Arenaria melanocephala	Black turnstone	3
Calidris canutus	Red knot	3
Charadrius alexandrinus nivosus	Western snowy plover	1
Charadrius montanus	Mountain Plover	2
Haematopus bachmani	Black oystercatcher	3
Laterallus jamaicaensis	Black rail	1
Limnodromus griseus	Short-billed dowitcher	3
Limosa fedoa	Marbled godwit	3
Numenius americanus	Long-billed curlew	2
Numenius phaeopus	Whimbrel	3
Phalaropus tricolor	Wilson's phalarope	3
Pluvialis dominica	American golden-plover	3
Pluvialis fulva	Pacific golden plover	3
Tryngites subruficollis	Buff-breasted sandpiper	3
Raptors		
Accipiter cooperii	Cooper's hawk	2
Accipiter striatus	Sharp-shinned hawk	2
Aquilla chrysaetos	Golden eagle	1
Asio flammeus	Short-eared owl	2
Asio otus	Long-eared owl	2
Athene cunicularia	Burrowing owl	2
Buteo regalis	Ferruginous hawk	2
Buteo swainsoni	Swainson's hawk	1
Circus cyaneus	Northern harrier (Marsh hawk)	2
Elanus leucurus	White-tailed kite	1

Falco columbarius	Merlin	2
Falco mexicanus	Prairie falcon	2
Falco peregrinus anatum	Peregrine falcon	1
Haliaetus leucocephalus leucocephalus	Bald eagle	1
Pandion haliaetus	Osprey	2
Non-passerine birds		
Aeronautes saxatalis	White-throated swift	3
Calypte costae	Costa's hummingbird	3
Chaetura vauxi	Vaux swift	2
Coccyzus americanus	Western yellow-billed cuckoo	1
Columba faciata	Band-tailed pigeon	3
Cypseloides niger	Black swift	2
Picoides nutallii	Nuttall's woodpecker	3
Selasphorus rufus	Rufous hummingbird	3
Sphyrapicus ruber	Red-breasted sapsucker	3
Selasphrous sasin	Allen's hummingbird	3
Passerine birds		
Agelaius tricolor	Tri-color blackbird	2
Baeolophus (Parus) inornatus	Oak (plain) titmouse	3
Carduelis (Spinus) lawrencei	Lawrence's goldfinch	3
Chamaea fasciata	Wrentit	3
Chondestes grammacus	Lark sparrow	3
Conotopus cooperi	Olive-sided flycatcher	3
Dendroica occidentalis	Hermit warbler	3
Dendroica petechia	Yellow warbler	2
Empidonax trailii	Willow flycatcher	1
Eremophila alpestris actia	California horned lark	2
Icteria virens	Yellow-breasted chat	2
Lanius ludovicianus	Loggerhead shrike	2
Piranga rubra	Summer tanager	2
Progne subis	Purple martin	2
Protonotaria citrea	Prothonotary warbler	3
Riparia riparia	Bank swallow	1
Spizella passerina	Chipping sparrow	3
Toxostoma redivivum	California thrasher	3
Vermivora luciae	Lucy's warbler	3
Vireo bellii	Bell's vireo	1
Xanthocephalus xanthocephalus	Yellow-headed blackbird	3

Table 6.1 Special-status bird species (subspecies)

6.2 Possible Impacts from Invasive Weed Eradication Methods

Controlled burns and herbicide application may potentially affect birds in the GND. Because of the small scale and limited current use of controlled burns, herbicide application represents the more significant source of potential impacts to birds. Potential effects, if any, of herbicides on birds in the GND are not expected to be a result of direct application of herbicides to birds but from a secondary route such as ingestion of recently treated plant or animal material or by a reduction in prey species or plant cover. Thoughtful selection of herbicides used in the GND and careful application methods, such as is currently practiced in the GND; substantially reduce the potential for impacts to birds.

Fusilade® is used in the GND to kill invasive grass species. The herbicide works by inhibiting plant lipid synthesis and is degraded by microbial metabolism (Tu et al. 2001). The half-life in soils is one to two weeks. It strongly binds with soils, and is unlikely to contaminate water by runoff. Once in water, Fusilade® is hydrolyzed into fluazifop acid which is stable in water (Tu et al. 2001). Fusilade® is highly toxic to fish and aquatic invertebrates (Tu et al. 2001). Impacts to birds from Fusilade® were shown to be “slightly to practically nontoxic” and “slightly” toxic to birds skin and eyes (Tu et al. 2001). Fusilade® is toxic to mammals, including humans, if it is inhaled (Tu et al. 2001).

Glyphosate, also used in the GND, kills plant species by inhibiting the synthesis of certain plant amino acids needed for growth (Tu et al. 2001). Like Fusilade®, glyphosate strongly binds to soil particles which limit contamination from runoff. However, glyphosate has a long half-life, from two weeks to several years, with an average half-life of two months (Tu et al. 2001). In water glyphosate half-life is shortened to 12 days to ten weeks because it binds to sediments.

Glyphosate itself is relatively non-toxic to birds. When glyphosate is sold as Rodeo®, which has no surfactant, it is safe to use in aquatic environments. However, when certain surfactants are added to glyphosate, it becomes highly toxic to aquatic species (Tu et al. 2001). Documented damage from Rodeo® is when toxic surfactants are added (Tu et al. 2001).

Dugan (2005) found sand crabs located near the mouth of the Santa Maria River to be contaminated with DDT, a control agent no longer used. How this contamination currently impacts GND bird shorebird populations is unknown.

6.3 Sections Organization

The following sections depart from the previous format due to the large number of bird taxa found in the GND and the concomitantly large number of special-status species. For each bird section, there is generally a brief description of the birds in the group, which may be comprised of birds in several families or even orders. If the group has several special-status species, the general comments are fairly brief; the accounts of the special status species will provide more detailed information of birds in that group. In bird groups with few or no special status species, the general descriptions are more detailed.

As suggested above, although there is some controversy regarding the amount of herbicide use world-wide and its effects on wildlife, much of the literature suggests that the herbicides used, and the methods by which they are applied, in the GND have relatively low, if any discernable, impact to birds. This is especially true when the herbicides are applied by precision spraying to the invasive vegetation rather than employing a broad coverage method such as aerial spraying (Latka 1992). Due to a general lack of specific information or studies regarding the herbicides used and any effects they may have on the special-status bird species in the GND, we can only suggest or speculate as to any impacts to these birds of invasive weed species control methods currently used in the potential GND.

<u>Literature cited</u>

Dugan, J. 2005.

Latka, R. 1992.

Peterson, R. 1990.

Tu, M., C. Hurd, and J. Randall. 2001.

www.elkhornslough.org/. Accessed August 2005.

Www.Morrocoastaduibon.org. Accessed September 2004.

6.4 Bird Accounts

Following are accounts of each of the nine groupings of birds following those proposed by Peterson (1990).

6.4.1 Duck-Like Birds – Swimmers

Findings

Three families and thirteen species comprise this group of aquatic birds (Table 6.2): Gaviidae (loons – 4 species); Podicipedidae (grebes-6 species); and Phalacrocoracidae (cormorants-3 species). Of these, three species are special-status, two loon species and one cormorant species.

Habitat relationships

The majority of the “duck-like” water birds are reported from dune lakes (e.g. Oso Flaco Lake) and in the freshwater or salt mash environments at the mouth of the Santa Maria River, Arroyo Grande Creek or Pismo Creek. Most GND fresh water habitats contain emergent vegetation and are encircled with other riparian and coastal dune scrub habitats, providing excellent habitat for migrating or resident birds.

Potential effects of invasive plant species control methods

Although largely unknown, impacts to duck-like birds, if any, from current invasive weed control measures would be largely limited to those impacts from herbicide use in the GND and can reasonably be expected to be negligible considering the following factors:

- Current studies (Tu et al. 2001) show that herbicides used in the GND are slightly to almost nontoxic to birds;
- Herbicide application in wetland areas is a minor component of the entire weed control program in the GND and generally limited to two species (pampas grass and arundo);
- Extra care is exercised when using herbicide around wetlands to prevent herbicide from drifting into standing water, even though herbicides used in these areas are specially formulated for aquatic use.
- Herbicides are applied by spot application to target plants, not by broadcast spraying, thereby ensuring minimal unintentional application to non-target areas or plant species.

- These birds feed almost exclusively on aquatic animals, mainly fish, prey species that are expected to be little, if any, affected by current invasive plant species control methods.

CONFIRMED DUCKLIKE BIRDS (Misc. Swimmers)		**Relative Abundance**			**Seasonal Observations**				**Breeding Locale**
Scientific Name	**Common Name**	**Oso Flaco Lake**	**ODSVRA**	**GOF**					
Gaviidae	**Loons**								
Gavia pacifica	Pacific loon	-	-	R (M)	Sp	Su	F		E. Siberia, mw,. North America
Gavia adamsii	Yellow-billed loon	Incidental	-	R (M)				W	Arctic, from n USSR to nw. Can.
Gavia immer	Common loon	U	-	C (W)			F	W	Alaska, Can., n. US, G'land, Icel'nd
Gavia stella	Red-throated loon	-	-	R (S), C (W)	Sp		F	W	Arctic, circumpolar
Podicipedidae	**Grebes**								
Aechmophorus clarkii	Clark's grebe	C	-	U (M)		Su		W	w. United States & Mexico
Aechmophorus occidentalis	Western grebe	C	C	U (S), C (W)		Su		W	Western N. America
Podiceps auritus	Horned grebe	C	-	U (W)		Su		W	Northern parts of N. Hemsiphere
Podiceps grisegena	Red-necked grebe	C	-	R (M)			F	W	Eurasia, n. N. America
Podiceps nigricollis	Eared grebe	C	-	C (M)				W	Eurasia, Africa, w. N. America
Podilymbus podiceps	Pied-billed grebe	C	-	C (Res)	Sp	Su	F	W	**GND**; s. Canada to Argentina
Phalacrocoracidae	**Cormorants**								
Phalacrocorax aturitus	Double-crested cormorant	C	U	C (Res)	Sp	Su		W	Channel Islands, Shell Beach CA
Phalacrocorax pelagicus	Pelagic cormorant	U	-	U (Res)		Su		W	**GND**, Channel Is., few Pt. Sal
Phalacrocorax penicillatus	Brandt's cormorant	-	-	C (Res)		Su		W	Channel Islands
UNCONFIRMED DUCKLIKE BIRDS (Misc. Swimmers)		**Relative Abundance**			**Seasonal Observations**				**Breeding Locale**
Alcidae	**Auks**								
Cepphus columba	Pigeon guillemot	-	-	R (M)					Bearing Sea to Japan, s. CA
Cerorhinca monocerata	Rhinoceros auklet	-	-	R (M)					Islands in North Pacific (both sides)
Ptychoramphus aleuticus	Cassin's auklet	-	-	R (M)					Oceanic, colonizes sea islands
Synthliboramphus hypoleucus	Xantus's murrelet	-	-	R (M)					s. CA (Anacapa, S.B. Isl) to cen. Baja CA

NOTES:

OSVRA -- Oceano Dunes State Vehicular Recreation Area
GOF -- Guadalupe Oil Field
GND -- Breeding reported in Guadalupe-Nipomo Dunes
- -- Not observed; No data

Res Resident
C Common at some time
U Uncommon, even when most abundant
R Rare, even when most abundant
M Migrant

Sp Spring
Su Summer
F Fall
W Winter

Table 6.2 Confirmed and Unconfirmed Ducklike Birds

Brief accounts of GND duck-like birds - swimmers

Gaviidae - loons

Loons (*Gavia* spp.) are a small and ancient group of birds. All are migratory, wintering in coastal wetlands in temperate climes. They are specialized fish eaters, spending most of their time in water.

Table 6-2 shows the four loon species that occur sporadically in the GND. A fifth species, arctic loon (*G. arctica*), was noted as possibly occurring in the GND (Entrix, Inc. 1996, Dames & Moore 1979), but its occurrence has not been confirmed. Yellow-billed and common loons are special-status species and are discussed in more detail.

Neither Pacific or red-throated loons are at risk species. Pacific loons (*G. pacifica)* are one of the most numerous loons in North America. They occur along the Western Coast of the United States during the fall and winter. *G. pacifica* are rare visitors to the GND but have been observed in marine waters and estuaries near the GND.

Similarly, red-throated loons, *Gavia stella*, occur in marine waters offshore of the GND but have also been observed on rare occasions on Oso Flaco Lake by members of the Morro Coast Audubon Society (T. Edell MCAS, written communication November 2004).

Podicipedidae - grebes

Grebes are closely associated with water. Most species nest in freshwater lakes or ponds with abundant aquatic vegetation. Smaller grebes with short bills (e.g. pied-billed) take mostly aquatic invertebrates including insects and their larvae, crayfish, shrimp, small fish, amphibians, and aquatic vegetation. The larger species with long, sharp bills and long necks eat mostly fish. Grebes typically forage near the surface, but larger species can dive to depths of 90 ft. Grebes that migrate along the coast tend to remain close to shore (e.g. pied-billed and some red-necked), sometimes in large aggregations, although larger species can be found far out to sea on the open ocean. In overland migrations, grebes (e.g., eared, horned, red-necked, western) rely on stopover sites such as lakes, reservoirs, rivers or saline lakes.

Six species of grebes occur in the GND, mostly as winter migrants (Table 6.2; Appendix D). None of the six grebes are special-status species. Grebe populations are generally stable, but may be vulnerable because some species depend on just a few major lakes at certain seasons. In 1978, western grebes were on the National Audubon Society Blue List (Arbib 1977; Remsen 1978) with possibly declining populations, but are not currently a species of concern.

Brief account of grebe species in the GND

Western grebes, *Aechmophorus occidentalis*, are large birds that consume fish, aquatic insects, crustaceans, and mollusks. They breed in lakes and ponds across the American west and winter primarily off the Pacific coast, often at fresher lakes with fish. Birds wintering on the coast of California sleep during the day and feed extensively at night (Ogilvie and Rose 2002.

Clark's grebe, *A. clarkii*, is similar in appearance to the western grebe but differs in coloration and size. They feed on fish, aquatic insects, crustaceans, and mollusks with a seasonal distribution similar to that of Western grebes.

Red-necked grebe, *Podiceps grisegena*, is another large grebe that eats fish, crustaceans, and insects. They spend the summer on marshy ponds and lakes in far northern U.S., Canada, and Alaska. They winter mainly on the western and eastern coastlines.

The diet of the small horned grebe, *P. auritus*, consists of fish, land and aquatic insects, frogs, and shrimp. They breed in summer on marshy ponds and lakes in far northern U.S., Canada and Alaska. In fall, they migrate mainly to the western and eastern coastlines and some inland lakes for winter rest.

Eared grebes, *P. nigricollis*, the most abundant grebe in the world, eat mostly insects (aquatic beetles, dragonfly larvae, flies, mayflies), crustaceans, mollusks, tadpoles, and a few small fish. During autumn stopovers on large alkaline lakes, they feed mainly on brine shrimp. Eared grebes may use settling ponds at sewage treatment plants. They breed in shallow wetlands in western North America.

Shelled prey such as crayfish are a large part of their diet of pied-billed grebe, *Podilymbus podiceps*. Pied-billed grebe is common on lakes and ponds across North America and is the only species of grebe that breeds widely in both North and South America. Pied-billed grebes can nest in ephemeral pools and on small artificial ponds where sufficient prey is available. Dames and Moore (1979) and Burton and Kutilek (1991) report pied-bill grebes breeding in wetland (grassland – marsh) habitats in the GND (Table 6.1).

Habitat and occurrence within the GND

All six species of grebe were found associated with freshwater wetland habitats at the GND (Appendix D). Pied-bill and red-necked grebes were the only species found exclusively in lacustrine and *Scirpus* (bulrush) marsh (Entrix, Inc. 1996). Four species were also reported from salt-water marsh and estuaries (Clark's, western, horned, and eared grebes). Only western grebe was found any distance from water on beach-dune strand habitat (Dames & Moore 1979).

Present status within the GND

Of the six species of grebe observed in GND, Morro Coast Audubon Society (MCAS) has recently sighted all but one (T. Edell MCAS, written communication November 2004). MCAS questioned the report of red-necked grebe by Burton and Kutilek (1991). That study reported 16 red-necked grebes and is substantiated by sightings at the Santa Maria River mouth in October 1978 and 1980 (Lehman 1994). We find however, no records of more recent observations of this species in the GND.

Phalacrocoracidae - cormorants

Cormorants, in the same order as pelicans, are exclusively fish-eaters, pursuing prey underwater to depths of 100 ft. (Harrison 1983). Although extensively aquatic, and primarily marine, they rest and nest onshore but near water. Their feathers are not entirely waterproof and they often spread-eagle their wings to dry them. Cormorants are highly gregarious in all aspects of their lives (fishing, flying, resting, and breeding). Most species are migratory.

Three species of cormorants are present in the GND: Table 6.2 presents aspects of their abundance and occurrence in the GND. Pelagic and Brandt's cormorants are almost exclusively marine species, rarely seen inland or in freshwater environments (Harrison 1983). Brandt's cormorants are very gregarious and prefer shallower water along rocky coasts while pelagic cormorants are more solitary and fish in deeper water (Harrison 1983). Both species are migratory and their occurrence in the GND is seasonal (Table 6.2). Neither is a special-status species.

Double-crested cormorants are a State species of concern and are discussed in more detail following.

Literature cited

Arbib, R. 1977.

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Harrison, P. 1983.

Lehman, P.E. 1994.

Ogilvie, M. and C. Rose. 2002.

Remsen, J.V. Jr. 1978.

Tu, M., et al. 2001.

Wilson, A. 2003.

Special-status species accounts

Following are species accounts for the three special-status duck-like bird species; common loon, yellow-billed loon and double-crested cormorant.

Due to close similarities in the biology of animals in the same genus, one species account is presented for the two special-status loon species observed in the GND.

Common loon *Gavia immer*

Yellow-billed loon *Gavia adamsii*

Status

Common loons are a Category 2 special-status species (sensitive) and yellow-billed loons are a Category 3 (of some concern).

Critical Habitat: None designated

Recovery Plan: No plans found for California, since loons no longer breed in the State. However, CDFG (Remsen 1987) recommends surveys for breeding pairs of common loons in lakes within their former range.

Special considerations:

Yellow-billed loons (*G. adamsii*) are rare visitors to the GND (Audubon 2004b). They are increasingly observed wintering inland throughout the contiguous 48 states, but it is not clear if this is a sign of range expansion or simply improved field identification of loons in winter plumage. Yellow-billed loon is a California Bird Records Committee (www.wfo.cbrc.org/cbrc/) review species because of their rarity in the state. Human disturbance at the nest sites, oil spills, and hunting are reasons yellow-billed loons are considered vulnerable (Audubon 2004b).

Common loons, the most frequently observed loon in the GND, are of special concern by CDFG due to declines attributed to human disturbance at breeding sites, especially by boats. The mere presence of canoes on breeding lakes were found to be the prime factor in the decline of common loons in Minnesota, causing incubating birds to either desert nest entirely or leave them unguarded and more susceptible to predation.

Habitat and occurrence within the GND

From 480 variable-circular plots, Burton and Kutilek (1991) observed three common loons in their survey of Oso Flaco Lake (OFL). Smith et al. (1976) and Entrix Inc. (1996) report common loons in marine waters and estuaries near the GND. Yellow-billed loons were reported once by Burton and Kutilek (1991) as an incidental stray.

Habitat in other areas

All loon species breed near deep, clear tundra lakes across the circumpolar regions in the far northern portions of Alaska and northern Canada. They winter along the North American, Asian and European coasts (Table 6.2).

Present status within the GND

Both species of loons are expected to occur infrequently in GND wetlands and estuarine habitats. Twice a year, in November and May, they occur along the GND coast and offshore waters. One yellow-billed loon was reported in Oso Flaco Lake in May, 2004 (MCAS 2004).

Life history

Common loons diet consists of about 80% fish with some crustaceans; aquatic plants, including algae, may constitute up to 20% of their diet (Granholm B003). Other food items, taken mostly on breeding grounds, include snails, leeches, frogs, salamanders, aquatic insects, and occasionally aquatic birds. Loons dive sometimes as deep as 200 ft. to pursue prey, or take it from the bottom, and may remain underwater up to three minutes.

Common loons are active all year. From September to May, common loons are fairly common in estuarine and subtidal marine habitats along the entire Pacific coast. Nearly the entire common loon wintering population migrates north to the main breeding grounds, departing California from April to May and returning again in September to November (Granholm B003).

Areas suitable to loons have minimal disturbance by humans and boats. Nest failures are sometimes caused by human disturbance, especially by motorboats. Mortality is caused by hunters in populated areas, and by oil spills. On the west coast, large male sea otters occasionally capture and consume adult loons. Because they nest on the ground, terrestrial carnivores prey them upon and foxes eat their eggs.

Literature cited

Audubon, J. J. 1827 to 1838.

Audubon. 2004-225.

Granholm, S. B003. 2004.

Remsen, J.V. Jr. 1978.

Double-crested cormorant ***Phalacrocorax auritus***

Status

Double-crested cormorants (DCCO's) are a Category 2 special-species status.

In recent years (1991), double-crested cormorants have increased dramatically in coastal regions of California and Oregon because of reduced human disturbance, reduced levels of marine pollutants in southern California, and recent use of artificial nesting areas in San Francisco Bay and Columbia River estuaries (Carter et al. 1991). Declines have been reported, however, at interior colonies in California, Oregon, and Washington due to water developments, human disturbance at colonies, and large-scale shooting of birds at fish hatcheries and other aquaculture facilities. Mesogenic Newcastle Disease was responsible for large die-offs of at the Salton Sea in 1997 (USFWS 1997).

Despite the large increases in breeding population, California Department of Fish and Game continues to list (in August 2004) the double-crested cormorant as a species of concern. Despite this, California anglers, resort operators, fish farmers, lake-home owners, politicians, and others, are calling for some kind of cormorant population control, believing that they compete with humans for fishery resources (Granholm B004).

Habitat and occurrence within the GND

Double-crested cormorants have been reported from the dunes by all core authors except Unocal (Appendix D). Smith et al. (1976) report cormorants (including Brandt's) present all year in wetland (freshwater marsh, open water) and estuary (coastal salt marsh) habitats, with highest population numbers during the winter months. Likewise, Burton and Kutilek (1991) report 407 DCCO in 480 variable-circular plots in wetlands habitats at Oso Flaco Lake. Other authors found DCCO near the ocean (Dames and Moore 1979, Entrix Inc 1996), shoreline (Kutilek et al. 1991) or estuarine (Entrix, Inc. 1996) habitats. Dames and Moore (1979) observed DCCO in summer. These observations match the known migratory and habitat associations for the species.

Habitat in other areas

Breeding colonies, sometimes numbering in the thousands of birds, require sites safe from ground predators and close to feeding areas (usually < 10 km). DCCO's use ponds, lakes, slow-moving rivers, lagoons, estuaries, and open coastlines. Where available, DCCO select small rocky or sandy islands and will also use artificial sites such as bridges, wrecks, abandoned docks or purpose-built towers. Nest trees are usually in or near water and birds will nest on emergent vegetation in marshes (Udvardy 1977; Zeiner et al. 1990). In all seasons, DCCO require suitable places for nighttime roosts and daytime resting. Roosts and resting places are often on exposed sites such as rocks or sandbars, pilings, wrecks, high-tension wires or trees near favored fishing sites. Like most colonial waterbirds, they may destroy vegetation at breeding or roosting sites through guano deposition that kills underlying vegetation and eventually trees.

Present status within GND

All surveys from the 1970's to 1990's indicate presence of DCCO in GND habitats. There are, however, no reported observations in the more recent surveys conducted in the GND (Unocal 1999-2004). Previous GND surveys by Dames and Moore (1979) and Entrix, Inc. (1996) reported DCCO.

Life history

The range of the double-crested cormorant overlaps those of Brandt's and pelagic cormorants on the Pacific coast, from southern Alaska to the Baja Peninsula. Pacific coast marine populations are generally non-migratory. In winter, Pacific coast and Alaska birds remain chiefly resident, though some dispersal occurs. Birds breeding in the interior and on the Atlantic coast are strongly migratory.

They are strictly piscivorous and forage in lakes, rivers, reservoirs, estuaries, or ocean. Birds dive from the water surface and pursue prey underwater, remaining submerged for up to 30 seconds. They prefer water less than 30 ft. deep with a rocky or gravel bottom, but may catch fish as deep as 72 ft. Sometimes the species feeds cooperatively in large flocks, often with pelicans.

Subspecies

The five subspecies of the double-crested cormorant have been described, based on size and crest characters: *P.a. albociliatus* (formerly Farallon cormorant) breeds primarily on the Pacific Coast but also inland, possibly to New Mexico, Utah and Montana; and is the subspecies present in the GND.

Other common names

Shag

Literature cited

Carter, H., et al. 1991.

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6.4.2 Waterfowl

Waterfowl are comprised of a single family, Anatidae, the ducks, geese, and swans. Here, however, are included coots and moorhens, duck-like swimming birds in the rail family Rallidae.

Waterfowl are the classic gregarious birds, frequently observed in large flocks. Flock formation is most pronounced during spring and fall migrations. Many species found in wetland habitats at the GND move from the Arctic and temperate zones along well-established routes to southern wintering grounds that include the GND lakes and extend as far as South America

Findings

The family Anatidae is very ecologically diverse, comprised of several subgroups based on morphology. The 35 waterfowl species found at GND (Table 6.3; Appendix D) are representatives of subgroups (or tribes) that include: swans (Cygnini, 1 sp.); geese (Anserini, 6 spp); whistling-ducks (Dendrocygnini , 1 sp); marsh or dabbling ducks (Anatini, 11 spp.); sea ducks and mergansers (Mergini, 6 spp.), bay ducks (Aythyini, 7 spp.), stiff-tailed ducks (Oxyurini, 1 sp.), and two duck-like swimming rail species (Rallidae). An additional two species are unconfirmed as occurring in the GND (Table 6.3; Appendix D).

Of the 32 confirmed species, two are special-status (Table 6.1; Appendix D) and one unconfirmed waterfowl species is also special-status (Appendix D). Apparently, the establishment of breeding and wintering reserves, well timed hunting seasons, and moderate bag limits allow the waterfowl populations to remain at robust levels.

Habitat relationships

Virtually all waterfowl are found in or near standing water, either freshwater, brackish water or salt water. One possible exception may be Canada geese which may be found in fields at some distance from water bodies (Sibley et al. 2001).

Potential effects of invasive plant species control methods

Any effects of invasive plant species control methods on waterfowl may be expected to be similar to that given for duck-like birds in the previous section.

Brief accounts of GND waterfowl

Anserini - geese

Geese are incidental fall to winter visitors to the GND. Although not numerically prominent in surveys, they do add to the population of birds wintering in the GND. No geese (or swans or whistling-ducks) breed in the GND. Geese are more terrestrial than ducks and often found grazing (except black brandt). Canada geese eat grass and grains. Their feeding habits are very regular and they may return day after day to the same location if they are not disturbed. They have become a nuisance species in some parts of the United States where large numbers congregate in city parks and golf courses. Cackling geese are known to winter in the GND (MCAS 2005). Black brandt and Canada goose are more common winter geese in the GND while greater white-fronted, Ross and snow geese are observed only occasionally.

CONFIRMED DUCKLIKE BIRDS -- WATERFOWL		Relative Abundance			Seasonal Observations	Breeding Locale
Scientific Name	**Common Name**	**Oso Flaco Lake**	**ODSVRA**	**GOF**		
Anatidae - Cygnini	**Swans**					
Cygnus columbianus	Tundra swan	Incidental	-	R (M)	Su W	Arctic south to Alaska
Anatidae - Anserini	**Geese**					
Anser albifrons	Greater White-fronted goose	U	-	R (M)	F W	Arctic, circumpolar
Branta canadensis	Canada goose	Incidental	-	R (M)	F W	Alaska, Canada, northern US
Branta nigricans	Brandt, (black)	-	-	C(Sp), R(F)	Su W	Coasts of n Eurasia & N. America
Chen caerulescens	Snow goose	Incidental	-	R (W)	F W	Arctic N. America & Eurasia
Chen rossii	Ross goose	-	-	R (M)	Sp F W	Arctic Canada
Anatidae - Dendrocygnini	**Whistling-Duck**					
Dentrocygni bicolor	Fulvous whistling-duck	-	-	-	Sp	so. US to Argentina, s. Asia, Africa
Anatidae - Anatini	**Marsh Ducks**					
Aix sponsa	Wood duck	Incidental	-	R (M)	Su F W	S. Canada, nw. & e. US, Cuba
Anas acuta	Northern pintail	C	-	C (Sp, Su)	Sp Su	**GND** + n. No. Hemisphere
Anas americana	American widgeon	C	-	C(W), R (Su)	Su F W	Alaska, w. Canada, N. US
Anas clypeata	Northern shoveler	C	-	C(W)	Sp Su F W	Northern hemisphere
Anas crecca	Green-winged teal	-	-	C (F)	Su F	Northern N. America
Anas cyanoptera	Cinnamon teal	C	-	C (Res+W)	Sp Su F W	**GND;** sw Can, w US, Mex, S. America
Anas discors	Blue-winged teal	C	-	U (F,W)	Sp F W	Canada to s. US
Anas penelope	Eurasian widgeon	U	-	R (M)	W	n. Eurasia
Anas platyrhynchos	Mallard	C	C	C(W),U(Res)	Sp Su F W	**GND;** n. No. America
Anas querquedula	Garganey	-	-	R (M)	F	Stray from Asia
Anas strepera	Gadwall	C	-	C (M)	Sp F W	**GND**, n. No. America, n. Eurasia
Anatidae - Mergini	**Sea Ducks, Mergansers**					
Clangula hyemalis	Oldsquaw [Long-tailed duck]	-	Incidental	R (M)	Sp F W	Arctic, circumpolar
Melanitta fusca (deglandi)	White-winged scoter	R	-	U(W)	W	n. Eurasia, Alaska, w. Canada
Melanitta nigra	Black scoter	-	-	R (M)	Su F	Alaskda, ne Can., Iceland, n Eurasia
Melanitta perspicillata	Surf scoter	U	U	C(W), U(S)	Su W	Alaska, n. Canada
Mergus merganser	Common merganser	R	-	C (M)	Su F W	n. Northern Hemisphere
Mergus serrtator	Red-breasted merganser	R	-	C (M)	W	n. Northern Hemisphere

Table 6.3 Confirmed and Unconfirmed Ducklike Birds – Waterfowl

CONFIRMED WATERFOWL (continued)		Relative Abundance			Seasonal Observations				Breeding Locale
Scientific Name	Common Name	Oso Flaco Lake	ODSVRA	GOF					
Anatidae - Aythyini	**Bay Ducks**								
Aythya affinis	Lesser scaup	C	-	C(W), R (S)	Sp	Su		W	Alaska, w. Canada, nw US
Aythya americana	Redhead	-	-	-		Su		W	w. Canada, w. & n.-cen US
Aythya collaris	Ring-necked duck	C	R	U (M)		Su	F	W	Canada, n. US
Aythya marila	Greater scaup	C	-	R (M)			F	W	Alaska, Canada, n. Eurasia
Aythya valisineria	Canvasback	C	-	U (W)		Su	F	W	Alaska, w. Canada, nw US
Bucephala albeola	Bufflehead	C	-	C (W)	Sp		F	W	Alaska, Canada
Bucephala clangula	Common goldeneye	-	-	-			F	W	Northern N. America
Anatidae - Oxyurini	**Stiff-tailed Ducks**								
Oxyura jamaicensis	Ruddy duck	C	-	C(W), U (S)	Sp	Su	F	W	**GND**; Canada s. to Grenada,Chile
Rallidae	**Duck-like Swimmers**								
Fulica americana	American coot	C	C	C (Res)	Sp	Su	F	W	**GND**, Canada to Argentina
Gallinula chloropus	Common moorhen	R	-	U (Su, W)	Sp	Su	F	W	**GND**; s. Can.-Arg.+ Eurasia, Afr.
UNCONFIRMED WATERFOWL		Relative Abundance			Seasonal Observations				Breeding Locale
Anatidae - Mergini	**Sea Duck, Merganser**								
Histrionicus histrionicus	Harlequin duck	-	-	-		Su			ne. Asia, Alaska, Canada, w US, Greenland, Iceland
Lophodytes cucullatus	Hooded merganser	-	-	-				W	se Alaska, s. Canada, ne. US

NOTES:

OSVRA -- Oceano Dunes State Vehicular Recreation Area
GOF -- Guadalupe Oil Field
GND -- Breeding reported in Guadalupe-Nipomo Dunes
- -- Not observed; No data

Res Resident
C Common at some time
U Uncommon, even when most abundant
R Rare, even when most abundant
M Migrant

Sp Spring
Su Summer
F Fall
W Winter

Table 6.3 Confirmed and Unconfirmed Ducklike Birds – Waterfowl (continued)

Cygnini - swans; Dendrocygnini - whistling-ducks

Swans and whistling-ducks, sometimes called tree ducks, are very rare fall or winter visitors to the GND and generally found in the dune lakes.

Anatini - marsh ducks; Oxyurini - stiff-tailed ducks

There are two broad ecological categories for ducks based on feeding habitats: dabblers and divers. Dabbling (or marsh) ducks feed on plant material and small animals (insects) by dabbling, the typical rump up and head underwater position, in shallow water. Shallow water being close to shore, and therefore subject to predation by land animals, dabbling ducks can take wing straight up out of the water when startled. Diving ducks (sea ducks, bay ducks, stiff-tailed ducks) may also eat plant and animal material but many are essentially carnivorous. Some dive to depths as deep as 180 ft. to forage on shellfish and crustaceans while others, such as mergansers, feed exclusively on fish.

Approximately 5 percent of the birds observed by Burton and Kutilek (1991) at Oso Flaco Lake were marsh ducks, prominently cinnamon teal, gadwall, mallard, and northern shoveler. A proportion of birds of each of these species does not make the long trip north in spring and have become residents in the GND coastal wetlands and estuaries (Smith et al. 1976). Rare marsh duck species found at GND wetlands are wood duck and European widgeon.

Among the marsh ducks, mallards are a ubiquitous species. Smith et al. (1976) report managers at the Dune Lake Properties regularly imported and brooded around 2,000 one-day old mallard chicks each year of which, the authors felt, a majority joined the natural populations during fall migrations. Mallards likely feed on bulrush (*Scirpus*) associated with wetland habitats.

Among the diving ducks, ruddy ducks represented over 20 percent (7,066) of the total 35,058 birds observed in twice a month for 12 months (Burton and Kutilek 1991; Kutilek et al. 1991). Largely vegetarian, they favor pondweed (*Potamogeton* sp.) and the seeds of other aquatic plants (e.g. *Scirpus, Eleocharis*), but also consume large numbers of midge larvae during the breeding season. They are a resident, breeding population in the dune lakes.

Aythyini - bay ducks

Five species of bay ducks (bufflehead, canvasback, greater scaup, lesser scaup, and ring-necked duck) are found in GND wetland habitats, mainly during winter. They composed 4.7 percent of the birds observed by Burton and Kutilek (1991) at Oso Flaco Lake. Ducks in this group mostly dive for aquatic vegetation, but scaups are more omnivorous. Aythyini ducklings rely heavily on protein-rich animal foods for early growth and development. Young birds and adults shift to energy-rich plant foods for migration and winter conditions, but in the spring, shift to a macroinvertebrate diet for egg production. Unlike dabbling ducks, diving ducks rarely exploit agricultural waste as a source of energy.

Mergini - sea ducks

Sea ducks are mostly oceanic, but not entirely. All five species confirmed in the GND were found in both estuarine and wetland habitats (Table 6.3; Appendix D). Common merganser and the rarely observed red-breasted mergansers, with their very long bills with tooth-like serrations, eat fish almost exclusively.

Rallidae - coots, moorehen

Included here are two species of rails, American coot and common moorhen. In surveys at Oso Flaco Lake Burton and Kutilek observed 4,293 American coots that represent over 12 percent of the 35,058 birds identified in the twice monthly samples taken from February 1990 to March 1991. They may be rather of a nuisance when they occur in large numbers in public areas such as parks with lakes or ponds or golf courses.

Related to coots is the common moorhen (*Gallinula chloropus*); which, unlike its name implies, is only infrequently observed in GND wetland habitats walking on floating vegetation (Smith et al. 1976, Burton and Kutilek 1991, M. Smith, MCAS written communication). They dive for aquatic insects, worms, and snails.

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Waterfowl special-status species accounts

Three waterfowl species are special-status; both are Category 2 (sensitive).

Fulvous whistling-duck *Dendrocygna bicolor*

Status

Fulvous whistling-ducks are a Category 2 special-status species.

While these ducks are among the most common duck in the world (Alderfer 2006), the majority of their population is in tropical areas. They are residents along the Gulf Coast from Texas into Florida. A smaller population is resident in southern California (Alderfer 2006). The numbers of this bird plummeted in the 1960 as a result of persistent pesticide poisoning (Flicklinger and King. 1972). However, their populations in the US in general, and in California in particular, appear to be currently stable if not expanding somewhat (Alderfer 2006).

Habitat and occurrence within the GND

Fulvous whistling-ducks occur on ponds and lakes within the GND and in the Santa Maria River Estuary (Marantz 1986; Lehman 1994).

Habitat in other areas

This species is most commonly found in fresh and brackish coastal marshes as well as irrigated and non-irrigated agricultural fields (Peterson 1990; Sibley et al. 2001; Alderfer 2006).

Present status within the GND

Fulvous whistling-ducks are not uncommon visitors to wetland habitats in the GND (Marantz 1986; Lehman 1994).

Life history

Fulvous whistling-ducks usually breed in February to March, making a platform nest a few inches above the water in dense wetland vegetation (Alderfer 2006). They may at times nest in trees (another common name of fulvous whistling-duck is tree duck). Nest parasitism is common in this duck where they may lay their eggs in nest of their own species or other species of duck.

Fulvous whistling-ducks are mainly dabbling ducks although they may make shallow dives. These ducks feed mainly at night, hiding in dense wetland vegetation during the day (Cogswell 1977). Their main food is vegetation such as soft green leaves, stems, acorns etc. which they strain from the bottom (Cogswell 1977). Another common feeding method is gleaning seeds, particularly rice and corn, from agricultural fields. They are also known to take seeds from grasses and weeds and also some fruit (www.nhptv.org).

Other names

Also called tree duck or fulvous tree duck although Cogswell (1977) considers this an inappropriate name since the bird if rarely found in trees or wooded areas.

Literature cited

Alderfer, J. 2006.

Cogswell, H. 1977.

Flicklinger, E., and L. King. 1972.

Lehman, P.E. 1994.

Marantz, C. 1986.

Peterson, R. 1990.

Sibley, D.A, Elphick, C., Dunning, JB (Eds). 2001.

www.nhptv.org

Cackling goose ***Branta hutchinsii***

Status

Cackling geese, *Branta hutchinsii*, as a species are not special-status. However, on at least one occasion, birds identified as “cackling geese, Aleutian race,” were seen at GND habitats by members of the Morro Coast Audubon Society (MCAS 2004). These birds are presumably one of the four recognized subspecies of the cackling goose, *B. hutchinsii leucopareia*, the Aleutian Canada goose. For the purposes of this report, these birds are here considered Category I special-status species because they were federally protected from 1973 until de-listed in 2001 (Cornell 2004).

Cackling geese were separated from the well known Canada goose in 2004 by the American Ornithological Union based on a number of characteristics including size, coloration, vocalization, breeding areas, and chemical differences (Banks et al. 2004). This re-classification resulted seven or so subspecies of Canada geese (*Branta Canadensis*) and four subspecies of cackling geese with a further result of adding a certain amount of uncertainty in field identifications of subspecies (SibleyGuides 2004). It is possible that the subspecies identified as the Aleutian race of cackling goose was a misidentification of another, more common subspecies, *B. hutchinsii minima*, rather than the rarer Aleutian race with a very restricted range (SibleyGuides 2004). However, for the benefit of the doubt, the subspecies *B. hutchinsii leucopareia* is assumed to have been present in the GND.

Habitat and occurrence within the GND

Cackling geese, "believed to pertain to the subspecies *minima* and *leuropareia*," have been observed over-wintering at the mouth of Pismo Creek and Arroyo Grande Creek and near the Oceano County Park (MCAS 2004, 2005).

Habitat in other areas

Cackling geese, similar to their generally larger relatives the Canadian geese (honkers), are found in lakes, ponds, bays, marshes, and fields (Kaufman 1996).

Present status within the GND

Cackling geese seem to be regularly observed in the winter in various GND habitats easily accessible to bird-watchers. There were no reports that placed the birds in either the Santa Maria River estuary or on Oso Flaco Lake or other dune lakes.

Life history

Both of the subspecies of cackling geese that may occur in the GND breed in the northern reaches of Canada with the Aleutian goose breeding in the Aleutian islands and the cackling Canada goose (*B.c. minima*) breeding along the coast of Alaska further south of the Aleutian Islands (Oceanwanders 2005). Both subspecies winter along the Pacific coast states from Oregon to the Central Valley in California (Oceanwanders 2005).

Cackling geese are almost entirely herbivorous and eat a variety of plants, especially grasses, sedges, seeds and berries (Kaufman 1996; Cornel 2004). They may eat cultivated grains especially on refuges and they may take some insects, mollusks, crustaceans, and perhaps small fish (Kaufman 1996). They feed by grazing, while walking on land but may also feed on aquatic plants by "dabbling" (Kaufman 1996).

Potential effects of invasive plant species control methods

Unknown. Their numbers in the GND appear to be small, limited to primarily winter months. Since they are known to graze on grasses and grass seeds, they may encounter veldt grass which has been treated, although it is not known whether they eat the leaves or seeds of this grass. Consumption of this treated material, if it occurs at all, can reasonably be expected to cause negligible harm to the birds for reasons explained previously.

Literature cited

Banks et al. 2004.

Cornell. 2004.

Kaufman, K. 1996.

MCAS. 2004-05. (Morro Coast Audubon Society).

Oceanwanders. 2005.

Sibley Guides. 2004.

Canvasback duck *Aythya valisineria*

Status

Canvasback ducks are a Category 2 special-status species.

Similar to other waterfowl species, canvasback ducks suffered major population decreases in the 1920's and 1930's because of over hunting and habitat (wetland) destruction. Their numbers increased through conservation measures undertaken organizations such as Ducks Unlimited and the Audubon Society. A period of low numbers of canvasback ducks occurred between 1982 and 1995 but their population is currently recovering and appears stable (Alderfer 2006).

Habitat and occurrence within the GND

Canvasback ducks are relatively commonly observed on ponds and lakes within the GND and in the Santa Maria River Estuary (Burton and Kutilek, 1991). They occur in summer and fall but may be somewhat more common in winter.

Habitat in other areas

In the spring breeding season, canvasback ducks inhabit freshwater ponds, lakes, marshes and alkali lakes (Alderfer 2006). During fall southern migrations, they can be found in similar freshwater habitats as well as brackish bays and estuaries as well as salt water environments such as San Francisco Bay (Cogswell 1977)

Present status within the GND

Canvasback ducks are relatively commonly observed in Oso Flaco Lake in late fall and winter (MCAS website).

Life history

Canvasback ducks breed primarily in the mid-western United States north through Canada and into Alaska (Alderfer 2006). They leave the breeding grounds between October to November for wintering sites along the Pacific coast from the Pacific northwest south into Mexico (Cogswell 1977; Alderfer 2006). They tend for form large flocks, or rafts, in their favorite wintering areas.

The diet of canvasback ducks is primarily submerged vegetation that they obtain by diving, often fairly deeply (Sibley et al. 2001). Their specific name is the genus of wild celery, a reference to both their favorite food item in the East as well as their reputed excellent flavor at the table. Other items consumed by canvasbacks, primarily in brackish and saltwater environments include invertebrates such as clams, worms and crustaceans (Cogswell 1977)

Literature cited

Alderfer 2006.

Cogswell, H. 1977.

Sibley, D.A, Elphick, C., Dunning, JB (Eds). 2001.

www.morrocoastaudubon.org. Accessed November, 2005.

6.4.3 Seabirds

Five families of birds comprise the seabirds known to occur in the GND: Procellariidae (shearwaters); Pelicanidae (pelicans); Fregatidae (frigate birds); Laridae (gulls, terns); and Alcidae (auks, murres). With the exception of some gulls and white pelicans, seabirds in these families are almost exclusively marine species. These five families belong to three orders of birds, not closely related, and are grouped here because they are generally marine. Alcids are placed here rather in the previous section (following Peterson 1990) for this reason.

Findings

Thirty-four species of seabirds are confirmed to occur in the GND (Table 6.4; Appendix D). Gulls (15 species), and terns (8 species) are the most common and abundant seabirds in the GND (Table 6.4). Pelagics, as explained above, are rarely documented as GND species. Both species of pelicans that occur in North American occur in the GND, where brown pelicans can be numerous at times in the aquatic habitats. Both pelicans are special-status species and discussed in more detail in the following species accounts. Table 6.4 and Appendix D lists 15 additional seabird species whose presence in the GND is currently unconfirmed. Most are pelagic or otherwise almost exclusively marine species.

Brief accounts of GND seabirds

Procellariidae shearwaters

Procellariids are true pelagics, with a wide distribution that breed in remote areas and can occur in great numbers in waters offshore of the GND (e.g., sooty shearwaters). They have little, if any, direct effect on the terrestrial or wetland ecosystems of the GND. Unlike marine mammals (seals, sea lions, whales, porpoise etc.) and marine invertebrates (Pismo clams, sand crabs, sea stars etc.), which are presented in Appendix H but not included in the discussion of possible effects of invasive weed control in the GND, the birds listed as confirmed by the various authors, using their individual criteria for including a bird taxa as present in the GND, are presented as such here (Table 6.4 and Appendices D) even if they are exclusively pelagic species. Four species of shearwaters were observed from the beach areas of the GND by various observers (Appendix D). Also included in this group are one species of jaeger and the black skimmer.

Laridae gulls

Gulls are ubiquitous inhabitants of shorelines around the world, except for some tropical regions. Gull populations in North America are rapidly expanding as gulls adapt to a human-altered landscape (Roberson and Tenney 1993). Most of the 14 species of gulls recorded in the coastal dune strand, beach, estuary, and wetland habitats in the GND

(Table 6.4) are part-time visitors to the area. Western gull (*Larus occidentalis*) and Heermann's gull (*L. heermanni*) are resident species (Dames and Moore 1979). Three gull species found in the GND are special-status species (Table 6.1; Appendix D).

At the GND, Smith et al. (1976) report gulls were common at the mouth of the Santa Maria River and adjacent to the Nipomo wetlands, described as resting and feeding areas. At that time, ring-billed and Heermann's gulls were observed most frequently. In a later study at the Oceano Dunes State Vehicular Recreation Area, Kutilek et al. (1991) found gulls to represent over 55% (12,868) of the 23,329 birds counted. Heermann's (7,282) and herring (3,435) gulls represented over 45% of the shoreline gulls. Ring-bill (943), California (703), and Bonaparte's (405) gulls comprised another 7+% in this 1989-1990 census (Table 6.4).

A different composition of gulls was associated with fresh water at Oso Flaco Lake where gulls represented less than 2% of the 35,058 birds seen or heard in 1990-91 (Burton and Kutilek 1991). Ring-bill (539), Bonaparte's (52) and mew (33) comprised the majority of gulls in and around Oso Flaco Lake. No gulls were exclusively associated with freshwater (Burton and Kutilek 1991).

Of the gulls observed in shoreline and wetland habitats, ring-bill, mew, and western gulls maintain approximate relative abundances indicating no overarching preferences for either habitat. Heermann's, herring, and California gulls, however, were distinctly associated to shoreline habitats. Dames and Moore (1979) survey of the Guadalupe Oil Field indicated these latter three species and western gulls are common along the beach and marsh-grassland habitats (wetland) during summer. Western gulls were observed in all four seasons, corroborating observations elsewhere along the coast describing western gull's omnipresence (Roberson and Tenney 1993).

Laridae terns

Eight species of terns (Table 6.4) have also been confirmed in GND wetland and coastal habitats. Five tern species are special-status species (Table 6.1) and will be discussed following. Terns are primarily fish hunters frequently observed hovering over water and diving in for the catch. After hitting the water, they fly up and are rarely found swimming on the surface.

Kutilek et al. (1991) indicate that Forster's (86), least (31), elegant (5) and Caspian (4) were the most commonly observed terns in their 1989-1990 shoreline transect study. Likewise, Dames and Moore (1979) indicate these four were common in summer. Least terns, the only Larid species breeding within the GND, were also the only Larid observed in foredune and active sand habitats (Dames and Moore 1979). At Oso Flaco Lake, California least (208), Caspian (184) and Forster's (133) were the most commonly observed terns by Dames and Moore (1979).

Common tern (*Sterna hirundo*) and royal tern (*Sterna maxima*) have been observed in limited numbers along coastal, estuaries, and wetlands habitats of the GND (Smith et al. 1976, Dames and Moore 1979;). Dames and Moore (1979) indicate that common terns are uncommon and royal terns are common in areas near the GND and Oceano Dunes SVRA. Arctic terns (*Sterna paradisaea*) are rare visitors to the GND.

Alcidae auks, murres

Two alcid species are reported to occur in the waters of the GND, the common murre, and the marbled murrelet (Table 6.4). Common murres may be resident species along the coast in the general GND area. They eat mainly fish, which they capture while swimming underwater. Common murres mainly occupy salt-water environments. Marbled murrelet are special-status species and described below.

Seabird special-status species accounts

Twelve seabird species observed in the GND are special-status species (Table 6.1; Appendix D: Of these, 3 are Category 1 special-status species (very sensitive), 5 are Category 2 special-status species (sensitive) and 4 are Category 3 special-status species (of some concern).

CONFIRMED LONG-LEGGED WADING BIRDS		Relative Abundance			Seasonal Observations				Breeding Locale
Scientific Name	**Common Name**	**Oso Flaco Lake**	**ODSVRA**	**GOF**					
Ardeidae	**Heron, Bittern**								
Ardea alba	Great egret	C	-	C (W, Sp)	Sp	Su	F	W	US to s. South America
Ardea herodias	Great blue heron	C	U	C (Res)	Sp	Su	F	W	**GND;** s. Canada to Mexico
Botaurus lentiginosus	American bittern	C	-	U (Res)	Sp	Su	F	W	Canada to Gulf States
Bubulcus ibis	Cattle egret	-	-	C (W)	Sp	Su	F		s. Eurasia, Africa, N & S America, Australia, Hawaii
Butorides virescens	Green heron	C	-	C (Res)	Sp	Su	F	W	**GND**, nw US, se Canada to Argentina
Egretta thula	Snowy egret	U	U	C (W)	Sp	Su	F	W	**GND**, Northern US to Argentina
Ixobrychus exilis	Least bittern	-	-	R (M)	Sp		F	W	se Canada, US, n. Argentina
Nycticorax nycticorax	Black-crowned night heron	C	U	C (Res)	Sp	Su	F	W	**GND**, s Canada to Falklands, Eurasia, Africa, Pacific Isl.
Threskiornithidae	**Ibis**								
Plegadis chihi	White-faced ibis	-	-	R (M)		Su	F		western US to Argentina
UNCONFIRMED LONG-LEGGED WADING BIRDS									
Ciconiidae	**Stork**								
Mycteria americana	Wood stork	-	-	R (M)			F		Southern US to Argentina
Gruidae	**Crane**								
Grus canadensis	Sandhill crane [nr Guadalupe 79-80]	-	-	R (M)			F	W	ne Siberia, N. Amereica, Cuba

NOTES:

OSVRA -- Oceano Dunes State Vehicular Recreation Area	Res Resident	Sp Spring
GOF -- Guadalupe Oil Field	C Common at some time	Su Summer
GND -- Breeding reported in Guadalupe-Nipomo Dunes	U Uncommon, even when most abundant	F Fall
- -- Not observed; No data	R Rare, even when most abundant	W Winter
	M Migrant	

Table 6.4 Confirmed and Unconfirmed Seabirds

American white pelican ***Pelecanus erythrorhynchos***

Status

American white pelicans are a Category 2 special-status species.

At the turn of the century, this species nested on large lakes along the entire length of California. Today there are no remaining nesting colonies in California, except along the Oregon border. Approximately 1,700-6,000 birds breed in the Klamath Basin refuges, with Clear Lake National Wildlife Refuge supporting the majority. Worldwide, approximately 15 colonies of this species are still in existence, with a total combined population of about 34,000.

Destruction of nesting islands and breeding habitat are probably the main reasons for the decline in white pelican population, although direct disturbance by humans also have contributed. Many nesting colonies are decreasing because people scare the birds off the nest during midday, causing deaths of many young due to exposure (Udvardy 1977). Pesticide contamination may be a factor in some areas.

Habitat and occurrence within the GND

White pelicans are occasional winter visitors to the larger water bodies among the GND. Smith et al. (1976) reported white pelicans were more abundant than brown pelicans. Burton and Kutilek (1991) report 32 white pelican observations from 480 variable circular plots.

Habitat in other areas

White pelicans are found near large shallow bodies of either fresh or salt-water that have fish (Udvardy 1977). They rest by day and roost at night along the edge of the water, on beaches, sandbars, or old driftwood, but never in trees (Granholm B042).

Present status within the GND

Records of white pelican presence in the dunes are restricted to just two studies and were observed by one of the authors (CC) at Oso Flaco Lake in 2005. Although the species is annually observed in other parts of San Luis Obispo County (e.g., Morro Bay, Atascadero Lake; DBI, personal observation), the regularity of this species' occurrence in the GND is uncertain from the available information.

Life history

White pelicans wingspan can reach to 9 feet. They are active yearlong. In tidal areas, they usually forage on a rising tide. Unlike brown pelicans, white pelicans do not dive on prey but dip them up in their pouch from the water surface. Prey is almost entirely fish, but occasionally take amphibians and crustaceans.

Most populations of American white pelicans are migratory. Populations breeding west of the Rocky Mountains typically move south to California and the west coast of Mexico from early September to late November. Migrant flocks are seen throughout much of California when the breeding population leaves northeastern California from October to March. Large numbers move into San Francisco Bay from July to December; fewer elsewhere in central and southern California. Small numbers winter locally, mainly in southern California. In March, migrants return to breeding grounds as far north as British Columbia.

White pelican breeding begins in March and April in California. Nests are built at large freshwater and salt-water lakes. Eggs are laid in April with a clutch size of usually 2 eggs, sometimes 1, and with up to 6 reported. Breeders may fly from 30 to 184 miles each day to forage for food for their young; Age at first flight is about 2 months, by September in most cases.

Mortality results mostly from human disturbance, "colony interactions" and bad weather. The major natural enemies are gulls, which steal eggs in small numbers. Coyotes can eliminate colonies if islands become connected to shore. White pelican are susceptible to pollution of watersheds by persistent pesticides. Degradation of breeding habitat has eliminated several major colonies in California.

Literature cited

Granholm, S. B042. 2004.

Remsen J.V., Jr. 1978-14.

Sibley et al. 2001.

Udvardy, M.D.F. 1977.

California brown pelican ***Pelecanus occidentalis californicus***

Status

California brown pelicans are a Category 1 special-status species. Federal Register 35:16047; October 13, 1970, and Federal Register 50:4945; February 4, 1985)

Critical Habitat: None designated

Recovery Plan: The California Brown Pelican Recovery Plan, (U.S. Fish and Wildlife Service 1983).

Special considerations

California brown pelicans were listed as endangered in 1970 as a result of widespread pollutant-related reproductive failures. Bioaccumulation of the pesticide DDT caused reproductive failure by altering calcium metabolism resulting in very thin eggshells

(Sibley et al. 2001). California breeding populations have rebounded since the elimination of DDT use but persistent residues in the coastal environment continues to cause chronic reproductive problems.

Several factors continue to threaten California brown pelicans in local waters:

- Northern anchovies and Pacific sardines, the primary food source for brown pelicans, have declined due, in part, to over-fishing by humans (high forage fish abundance in southern California waters is linked to improved reproductive success; Gress 2004).
- oil spills from tanker traffic in the Santa Barbara Channel;
- disturbance at post-breeding roosts on the central California coast;
- entanglement with hooks and fishing line;
- disease outbreaks resulting from overcrowding in harbors and large resting areas (e.g., Salton Sea);
- dramatic year to year variability in breeding populations and nesting productivity depending on environmental conditions (e.g. El Niño events) and other climatic changes.

<u>Habitat and occurrence within the GND</u>

California brown pelicans have been and continue to be regularly sighted along the GND sandy strand. Smith et al. (1976) report, “at times more than 250 individuals have been observed” at the mouth of the Santa Maria River. The dune beaches and estuaries support a robust population (482 observations in ODSVRA – Kutilek et al. 1991). Pelicans are infrequent visitors resting at Oso Flaco Lake (Burton and Kutilek 1991). Nesting has not reported in the GND.

<u>Habitat in other areas</u>

The California brown pelican is found in estuarine, marine subtidal, and marine pelagic waters along the California coast and inland at the Salton Sea. When not flying, they are found on offshore rocks and islands, in bays, coastal ponds, sloughs, river mouths, sand bars, breakwaters, pier pilings and jetties. These roosting and loafing sites provide important resting habitat for breeding and non-breeding birds.

<u>Present status within the GND</u>

Pelicans are commonly observed along the beach-dune strand and at the estuarine habitat at the mouth of the Santa Maria River (Unocal 1999-2004). All available reports (Appendix D) included observations of pelicans in these habitats during their surveys.

Life history

The California brown pelican (*Pelecanus occidentalis californicus*) is one of five recognized subspecies of brown pelican. The large brown adults weigh approximately 9 pounds, with a wingspan of over 6 feet. They are easily distinguished from the American white pelican, the only other pelican in its range, which is white with black primary and secondary flight feathers.

California brown pelicans breed in nesting colonies on islands without mammal predators from the Channel Islands of southern California southward along the Baja California coast and in the Gulf of California to coastal southern Mexico. The only breeding population in United States waters is on West Anacapa Island and Santa Barbara Island in Santa Barbara County, California. From 1993 through July 2004, the number of breeding pairs on these two islands varied between approximately 4,200 and 7,500 (Gress 2004).

A typical nest is made of sticks on the ground; old nests can be several feet high. All courtship occurs at the nest site. Normal clutch size is three eggs, laid in March or April. Both take turns incubating the eggs and rearing the chicks.

California brown pelicans dive from flight to capture surface-schooling fishes. In California they feed primarily on Pacific mackerel, Pacific sardine and northern anchovy with anchovies comprising 90 percent of their diet during the breeding season.

Subspecies

Of the five recognized subspecies of brown pelican, *Pelecanus occidentalis*, only *P. o. californicus* occurs in the GND.

Literature cited

California Department of Fish and Game. 2000.

Gress, F. 2004.

Sibley et al. 2001.

U.S. Fish and Wildlife Service. 1983.

Additional information sources

Anderson, D.W., et al. 1975

Granholm, S. B043.

Thelander, C. ed. 1994.

California gull *Larus californicus*

Status

California gulls are a Category 2 special-status species.

Falling water levels in Mono Lake, CA where 80-90% of the state's nesting population breeds, subject the nesting birds to increased predation from terrestrial predators. Ultimately, increased salinity resulting from the falling water levels can be expected to eliminate the food supply of the gulls along with nearly a million other water birds that use this lake. California gulls have, however, increased their numbers and range in recent decades. They are the gulls that inspired the seagull monument in Salt Lake City, Utah as the bird that saved crops from the 1848 grasshopper plague.

Habitat and occurrence within the GND

In the GND, Burton and Kutilek (1991) and Kutilek et al. (1991) reported California gulls in beach - dune strand, estuarine and lake habitats (Appendix D) but appear to prefer beach and estuary habitats. In shoreline transects, Kutilek et al. (1991) counted 703 *L. californicus*, representing 3 percent of all birds. In wetland habitats at Oso Flaco Lake, however the number of California gulls was much lower as Burton and Kutilek (1991) observed just seven.

Habitat in other areas

California gulls can be found along the coast on sandy beaches, mudflats, rocky intertidal, and pelagic areas of marine and estuarine habitats, as well as fresh and saline emergent wetlands and inland in lacustrine, riverine, and cropland habitats, as well as landfill dumps and open lawns in cities (Rigney 1983).

Present status within the GND

California gulls are common summer and winter migrants to the GND beaches and estuaries (Burton and Kutilek 1991, Kutilek et al. 1991). In 2004, Morro Coast Audubon Society members fairly regularly report its occurrence in along the beach and lake habitats (M. Smith and T. Edell written communication, November 2004).

Life history

In summer California gulls are found near large freshwater lakes and reservoirs where they roost in large concentrations along shorelines, landfills, pastures, and on islands. During winters they are found primarily along coastlines, especially near beaches and garbage dumps (Cogswell 1977).

In winter, this omnivore feeds on earthworms, adult and larval insects, carrion, and garbage. They often forage in dryland fields and farms for insects. On breeding grounds, young gulls are commonly fed larval insects, brine shrimp, young birds, garbage, earthworms, and insects (Rigney 1983).

Nest sites are set on islands in alkali or freshwater lakes and salt ponds in California (Rigney 1983). Nests are a scrape lined with grasses, feathers, or rubble, on sparsely vegetated portion of isolated island. California gulls nest from mid-April through mid-August, with peak nesting occurring in late May through June. They usually nests in colonies, often in association with other water birds. The world's largest colony nested at Mono Lake until 1979. This colony was destroyed when mainland predators crossed to the breeding island (Negit Island) on a land bridge that emerged with receding lake waters although several thousand gulls continue to breed on smaller islands nearby.

After breeding, California gulls move northwest to the coast as far north as British Columbia, west and southwest to the coast of California. In August and September, this is the most common gull at dumps in California, displaced later by influx of larger gulls such as herring gulls (Cogswell 1977).

<u>Literature cited</u>

Cogswell, H.L. 1977.

Remsen, J.V. Jr. 1978b.

Rigney, M. 1983.

Udvardy, M. 1977.

Laughing gull ***Larus atricilla***

<u>Status</u>

Laughing gulls are a Category 3 special-status species.

Laughing gulls are a primarily east coast bird and are described as the classic “parking-lot gull” of East coast and Gulf coast beaches (Alderfer 2006). Their populations were seriously reduced by egg gathering and plume hunters in the late 1800’s but have rebounded and are stable as of late 1900’s (Alterfer 2006)

<u>Habitat and occurrence within the GND</u>

Laughing gulls are uncommonly observed on ponds and lakes within the GND and in the Santa Maria River Estuary (Unocal 2000-2004; MCAS website, 2005). They occur in winter and spring (Table 6.4).

<u>Habitat in other areas</u>

One the East and Gulf coasts, laughing gulls inhabit all manner of coastal habitats and may also be found inland in parking lots and at landfills (Alderfer 2006). They prefer warm coastal waters. The cold California Current is thought to restrict their occurrence along the Pacific coast to the Gulf of California, southern Baja California, Mexico and inland areas of southern California such as the Salton Sea, where they may have bred (Cogswell 1977).

Present status within the GND

Laughing gulls are rare visitors to the GND.

Life history

These gulls breed in large colonies in coastal areas or among beach grasses primarily along the East and Gulf coasts (Cogswell 1977). They are not known for extensive migrations and are considered true coastal birds, rarely found inland (Cogswell 1977; Alderfer 2006).

Their diet of is primarily aquatic invertebrates but they are also known to take fish, small birds, bird eggs, and insects (often on the wing) and will consume scat, carrion, garbage and parking lot scraps (Cogswell 1997;Sibley et al. 2001, Alderfer 2006). They are not generally known to dive and seem to favor aerial foraging over land or water (Cogswell 1977).

The very catholic diet of laughing gulls suggests there may be some potential effect to them from the invasive weed control program through ingestion of an invertebrate which encountered a herbicide. The chance of this occurring appear very small given that they seem to prefer to take insects on the wing and generally over ponds or beach, neither of which area is treated. Beach areas are not treated during the times when laughing gulls may be present due to the presence of western snowy plovers along the beaches.

Literature cited

Alderfer 2006.

Cogswell, H. 1977.

Sibley, D.A, Elphick, C., Dunning, JB (Eds). 2001.

www.morrocoastaudubon.org. Accessed September, 2006.

Heermann's gull ***Larus heermanni***

Status

Heermann’s gull is a Category 3 special-status species.

The main threats to Heermann's gulls are on their island nesting grounds, where they are vulnerable to harvesting of eggs by fisherman, nest predation by introduced mammals, industrial development for guano extraction, and tourism (Audubon Society 2002-103).

<u>Habitat and occurrence within the GND</u>

Heermann's gulls are, at times, one of the most numerous birds in the GND. Kutilek et al. (1991) observed 7,282 in dune strand and estuarine habitats during shoreline transects conducted during 1989-1990 (Table 6.3). In that survey they represented 31.2% of all (23,329) birds observed. Surveys conducted by Entrix Inc. (1996), as well as Smith, et al (1976), report Heermann's gulls as common in the shoreline sections of the dunes. Dames& Moore (1979) also report Heermann's gulls in wetland (marsh-grassland) habitats in summer and fall, although they were not observed at Oso Flaco Lake during Burton and Kutilek (1991) survey in March 1990-February 1991 (Appendix D).

<u>Habitat in other areas</u>

Heermann's gull occurs in marine habitats, rocky intertidal areas, river mouths, bays, lagoons and offshore islands (including the Channel Islands), and are common as far north as Monterey Bay (Cogswell 1977; Beedy 1983b).

<u>Present status within the GND</u>

Heermann's gulls are a common summer and fall migrants to the dunes shoreline, estuaries (Smith et al 1976, Kutilek et al 1991, Entrix Inc. 1996) and wetlands (Dames & Moore 1979). In 2004, Morro Coast Audubon Society members regularly report its occurrence in along the beach (M. Smith, written communication, November 2004).

<u>Life history</u>

Heermann's gull is strictly a coastal bird, found along beaches, rocky shoreline, estuaries, and lagoons. It is the only North American gull that migrates southward to breed, and northward again in large numbers for fall and winter (Udvardy 1977, Beedy 1983b).

Their preferred feeding areas are offshore kelp beds, rocky shorelines, and sandy beaches (Cogswell 1977). It eats marine fishes, shrimps, mollusks, and crustaceans, as well as scavenging shorelines with other gulls. When at sea, Heermann's gulls float or rest on pieces of driftwood or other flotsam. On shore, they inhabit sandy beaches or rocky intertidal areas, usually with other species of gulls. They do not frequent fresh water areas (Cogswell 1977).

Heermann's gulls nest on islands along the coast of western Mexico from February to May; one island supports 300,000 breeding birds, representing 95% of the world's breeding population (Audubon Society 2002-103). After the chicks fledge, the gulls move northward as far as southern British Columbia. In California, Heermann's gulls are a common visitor in summer and fall. Numbers decline in winter, and occurs irregularly through spring, especially in northern coastal areas (Beedy 1983, Audubon Society 2002-103).

Literature cited

Audubon Society. 2002-103.

Beedy, E. 1983b.

Cogswell, H.L. 1977.

IUNC 2006.

Udvardy, M. 1977.

California least tern *Sterna antillarum browni*

Status

California least terns are a Category 1 special-status species.

The California least tern was listed by the federal government as Endangered in 1970. It is currently listed by the State of California as Endangered and is fully protected under state statute. The USFWS has not designated any critical habitat for this species.

In 1980, the USFWS published the California Least Tern Recovery Plan, which set out the recovery objectives for this species. The stated chief limiting factor influencing the number of breeding pairs is the availability of suitable habitat in the breeding grounds. While the mouth of the Santa Maria River was identified as one of the essential areas for this species, it was not considered critical habitat. Based on 1994 data, the 1,200 breeding pair objective in the Recovery Plan has been achieved (J. Schneider, pers. comm., 2005). Recent available information available estimates 3,451 to 3,674 pairs of California least terns nested at 36 nesting sites in 1999 and produced an estimated 671 to 711 fledglings (Keane 2001).

Included in the Habitat Conservation Plan (HCP) for Rancho Guadalupe Dunes County Park (FEMA 2003 a and b) are requirements developed for wildlife projects involving California least terns among other species:

- rope fences with signage during breeding seasons to divert most human disturbances away from nesting sites, allowing increased reproductive success.

- educating visitors through ongoing informative brochures and signage at entry points to give visitors a sense of participation on their part to help protect the terns.

- trash facilities with lids that tightly seal to limit odors and prevent attraction of predators that prey on eggs and chicks.

Habitat and occurrence within the GND

In the GND, California least terns are known to breed in the foredune habitat near the mouth of the Santa Maria River, at Guadalupe/Mussel Rock Dunes and at Oceano Dunes SVRA. In 1999, at these latter two sites, there were 24 and 15 pairs, respectively, that fledged 7 and 12 young, respectively (Keane 2001). This follows a year of no breeding at Guadalupe/Mussel Rock Dunes and 25 fledging from the Oceano Dunes in 1998.

The nesting colonies in Santa Barbara and San Luis Obispo counties support a relatively small portion of the total statewide population (1.9% in 1999, Keane 2001). However, they represent the only currently active breeding areas between Ventura County and San Francisco Bay.

Habitat in other areas

California least terns nest in colonies on sandy and pebbly beaches along the coast; sandbars in large rivers. Nests are often on landfill and occasionally on rooftops.

Adults do not require cover during the breeding season, but chicks may use sparse vegetation and debris for shade and protection. Parents may lead chicks toward the periphery of the colony into more heavily vegetated areas, where the young use debris and vegetation for cover. In coastal areas, beach grass (*Ammophila spp.*) is the commonly associated vegetation. Along river systems, willow (*Salix* spp.) is the common vegetation adjacent to sites (The Nature Conservancy 1998).

Present status within the GND

All surveys, excluding the Unocal 1999-2004 database, indicate continued presence of California least terns in the GND (RareFind 3.1). Family groups of California least terns have been observed hovering over and feeding in Oso Flaco Lake by Morro Coast Audubon Society members (M. Smith, pers. comm. 2005). They are observed on a regular basis around Oso Flaco Lake by various field personnel and managers in the GND (G. Greenwald, pers. comm. 2006).

Life history

California least tern frequent beaches, bays, and ocean estuaries along the West Coast from San Francisco Bay to Cabo San Lucas, Baja California, Mexico from April through September, their breeding season. Breeding birds arrive on the California nesting grounds in late April and nesting begins in mid-May. They nest in loose colonies of 30 to

50 pairs on barren or sparsely vegetated sites with a sandy or gravelly substrate that are relatively free of predatory species and human disturbance. Nests are scraped out depressions where one to three eggs are laid and attended by both the female and male. Most nesting is completed by mid-June when they leave the nesting grounds to forage along the coastal waters until their southern migration begins in September. The greatest egg losses are attributed to coyotes, crows and ravens; highest chick/fledgling losses were to American kestrels, coyotes and peregrine falcons (Keane 2001).

California least terns feed in near shore waters, especially where lagoons are nearby, or at mouths of bays and also in coastal freshwater ponds, channels, and lakes (Granholm B234). They are opportunistic feeders known to capture more than 50 species of fish that, in California, includes anchovy (*Engraulis* sp.), silversides (*Atherinops* sp.) and shiner surfperch (*Cymatogaster aggregata*).

In non-breeding behavior, least terns are usually observed foraging singly or in small loose groups, but form larger flocks when migrating. Flocks have been found at sea, often far from land. Maximum known natural longevity is 21 years (The Nature Conservancy 1998).

Potential effects of invasive plant species control methods

The greatest potential negative effect to least terns from the invasive weed control activities is likely disturbance to nesting birds. The potential of this happening was identified at the onset of the invasive control program and minimized by protocols designed to avoid disturbances to nesting birds.

Literature cited

CDF&G. 2004a. Rare Find3.1:

Granholm, S. B234.

Keane, K. 2001.

FEMA. 2003a.

FEMA. 2003b.

Remsen J.V., Jr. 1978.

The Nature Conservancy. 1998.

Udvardy, M.D.F. 1977.

Black tern ***Chlidonias niger***

Status

Black terns are a Category 2 special-status species.

From 1966 to 1989 black tern populations declined 71.8 percent due, in part, to the destruction or degradation of much of their breeding and migration stopover habitat and human over fishing in their winter habitat. (Hall 1995). Recent Breeding Bird Survey data, however, indicate that between 1980 and 2002, black tern population increased by 9.8 percent in the United States (14.7% in California) and 2.1 percent throughout North America (Sauer et al. 2004). A part of this improvement was attributed to retaining wetland habitat for breeding. However, pesticides and organochlorines found in black tern eggs and likely to negatively impact their reproductive success are accumulated while terns are migrating on their wintering grounds (Hall 1995).

Habitat and occurrence within the GND

In the GND, Burton and Kutilek (1991) report three black terns found in beach - dune strand and estuarine habitats (Table 6.3).

Habitat in other areas

Black terns nest in marshy freshwater wetlands. In winter, it can be found along productive marine coastlines, lagoons and estuaries, especially off the Pacific Coast of Panama.

Present status within the GND

Black terns are a rare migrant in the GND, first reported in by Barton and Kutilek (1991). Morro Coast Audubon Society members occasionally report them in unspecified dune habitats (T. Edell written communication, November 2004).

Life history

Black terns can be locally common in mid-April to September and a few occasionally to mid-November at mashes and rice fields of southeast California and the Central Valley. Black terns are also found inland in southwestern California. In April through May and again from late June to September they are found on bays, salt ponds, river mouths and on the ocean of central and more often southern California. They are recorded from northwest California including Sierra Nevada and southern mountain lakes or meadows. (Cogswell 1977).During migration, it uses large lakes and coastlines. In winter, it can be found along productive marine coastlines, lagoons and estuaries.

It is constantly on the move, circling and hovering with head down. Diet consists of grasshoppers, dragonflies, moths, flies, beetles, crickets, and other insects. From hovering positions above wet meadows and fresh emergent wetlands, they swoop to pluck food from the water’s surface. They can also forage in flight, snatching flying insects out of the air and will capture adult and larval insects from recently plowed agricultural fields. Although they rarely plunge-dive underwater, they will to capture tadpoles, crayfish, small fish, and small mollusks. Young are fed insects (Beedy 1983).

A marsh-breeding bird, black terns nest in freshwater wetlands with extensive, cover-providing, vegetation as well as open water. Its nests are flimsy platforms of cattail stems with small eggs balanced on them (Udvardy 1977). The major breeding territory for black terns is in southeastern British Columbia and across southern Canada, and south and east of the Cascades. Nesting occurs in central Nevada, Utah, Colorado, and across much of northeastern U.S. and much of Eurasia. In winter black terns migrate to ocean habitats off western and northeastern South America and on major rivers there and in Africa.

Literature cited

Beedy, E. 1983.

Cogswell, H.L. 1977.

Hall, Ross. 1995.

Sauer, J. R., et al. 2004.

Seattle Audubon Society. 2004.

Udvardy, M.D.F. 1977.

Elegant tern *Sterna elegans*

Status

Elegant terns are a Category 2 special-status species.

Elegant terns (*Sterna elegans*) have the most restricted breeding distribution of any tern in North America. They breed only in five nesting sites in southern California and northwestern Mexico where up to 97% of the world's elegant tern population nest on one island in Mexico (Uvardy 1977; Beedy 1983b). Audubon Society (2002-075) estimates the worldwide population to be 60,000 elegant terns.

Threats common to colonially-nesting seabirds are particularly serious for this species, due to its highly restricted, very concentrated breeding habits and include degradation of nesting sites, disturbance at breeding colonies and roost sites, and the introduction of non-native mammalian predators. The species' main breeding colony in Mexico faces the threats of egg harvesting, extensive mining of guano, and disruptive visits by tourists (Audubon Society 2002-075).

Habitat and occurrence within the GND

In the GND, Burton and Kutilek (1991) and Kutilek et al. (1991) reported a few elegant terns as uncommon summer and winter migrants in beach - dune strand and estuarine habitats (Appendix D).

Habitat in other areas

All land-based activity, whether breeding or roosting, occurs on sandy beaches or tide flats (Cogswell 1977).

Present status within the GND

Morro Coast Audubon Society members occasionally report elegant terns at the mouth of the Santa Maria River (T. Edell, written communication, November 2004; MCAS 2005).

Life history

Elegant terns are typically found along the shallow waters of estuaries and bays along the ocean. They are diurnally active, diving for prey mostly in the ocean beyond the surf zone, but occasionally in inshore bays or lagoons (Cogswell 1977). Their diet is mainly a variety of schooling fish, with northern anchovy being most important (Audubon Society 2002-075).

During the breeding season, elegant terns court and form pairs while still on migration and away from the nesting colony. They arrive at the nesting grounds and continue courtship and pair formation in small flocks close to, but not at, the nesting colony. They nest on sandy or rocky islands, usually in the company of larger, more aggressive birds, such as Heermann's gulls and Caspian terns. They tend to roost high up on beaches. Highly colonial, there may be 10 nests per square meter. Typical clutch size is one egg, which is probably incubated by both parents.

Following the breeding season, birds typically disperse northward to central and northern California, but they can move as far north as Oregon and Washington. During the winter, elegant terns are found along the Pacific coast from central Mexico to Chile.

Formerly elegant terns were a rare and irregular post-nesting visitor to coastal California (Cogswell 1977). During the 1950s, numbers increased, and large flocks are seen in most years off the southern coast (Cogswell 1977, Collins 2004). This species currently breeds in only five nesting colonies--three in Southern California, and two in northwestern Mexico (Audubon Society 2002-075). Elegant terns appear to be somewhat tolerant of human activity nearby their nesting sites as the three southern California nesting sites include the “salt works” at the southern-most end of San Diego Bay, the Bolsa Chica Ecological Area near a popular beach in Orange County Orange Counties, and Terminal Island in the Port of Los Angeles (Collins 2004).

There is a high degree of inter-colony movement from year to year within southern California perhaps influenced by local water conditions (Collins 2004). To date, no banded bird from one of the Mexican breeding colonies has been recovered in any of the southern California colonies. Terns banded at Bolsa Chica have been recovered in El Salvador, Costa Rica, and Colombia (Collins 2004).

Literature cited

Audubon Society. 2002-075.

Beedy, E. 1983b.

Cogswell, H.L. 1977.

Collins, C. 2004.

Udvardy, M.D.F. 1977.

Caspian tern *Sterna caspia*

Status

Caspian terns are a Category 2 special-status species.

The five North American colonies of Caspian terns are considered at risk because they have a very local distribution and tend to nest in colonies (Environ. Canada 2006). For example, 70% of the entire west coast population of Caspian terns nest in the Columbia River estuary (USFWS 2004)

Habitat and occurrence within the GND

Caspian terns are noted in all core studies from coastal, estuarine and wetland habitats in the GND (Appendix D). They are noted as generally common throughout the year (Table 6.4) and noted by Kutilek et al. (1991) as among the most common terns in their shoreline study.

Habitat in other areas

Caspian terns inhabit fresh- and saltwater wetlands, especially estuaries, coastal bays, and beaches. They prefer protected near shore waters and are not usually found on the open ocean.

Present status within the GND

Caspian terns are commonly observed along the immediate coast and in estuaries, ponds and lakes in the GND.

Life history

Caspian terns are fairly common at times and widespread throughout the American west (Cogswell 1977). They may migrate for short distances or from the Pacific Northwest to South America (Alderfer 2006). Nesting is in coastal, freshwater or brackish water habitats, usually in sandy or rocky areas of sparse vegetation (BirdWeb.org). Although 70 % of the western population of Caspian terns nest in one location in the Columbia River estuary (BirdWeb.org), They are also known to nest in smaller colonies. One such colony is in Monterey County at Elkhorn Slough where small numbers have nested successfully during some years up to 2004 (www.elkhornslough.org/caspiantern/). Caspian terns also use man-made areas such as dredge islands for nesting.

The diet of these terns is primarily fish, especially those that swim at the surface. At Elkhorn Slough, Monterey County, their prey species included anchovy, silverside, shiner perch, sculpins, topsmelt and crayfish (www.elkhornslough.org/caspiantern/). In the Columbia River estuary, Caspian terns forage almost exclusively on salmonid smolts to the extent that there is an effort to relocate the terns nesting site elsewhere to protect the smolts (USFWS 2004).

Potential effects of invasive plant species control methods

The current invasive weed control program in the GND cannot be expected to impact Caspian terns. Their diet is almost exclusively fish taken from ponds, lakes, estuaries or near shore coastal waters, all areas not treated with herbicides. Breeding success of these terns was shown to be impacted by legacy herbicides (DDT) in the Elkhorn Slough in recent times, after significant rains and runoff released the herbicides from nearby agricultural areas into the areas occupied by nesting terns (www.elkhornslough.org/caspiantern/).

Literature cited

Alderfer 2006.

BirdWeb.org. www.birdweb.org. Accessed September 2006.

Cogswell, H. 1977.

Elkhornslough.org. [www.elkhornslough.org/caspiantern/caspiantern.htm]. Accessed October 2006.

Environment Canada. 2006. Accessed September, 2006 [www.qc.gc.ec.ca/faune/]

USFWS 2004. Draft Environmental Impact Statement Issued on Caspian Tern Management In the Columbia River Estuary. July 2004. [www.migratorybirds.pacific.fws.gov/cate.htm].

Forster's tern ***Sterna forsteri***

Status

Forster's terns are a category 3 special-status species.

The primary problem facing Forster's tern is the destruction of their wetland and estuarine nesting habitat, particularly along the Atlantic and Gulf coasts and in the mid-western U.S. (CLO 2003i). Several Midwestern states list them as endangered (e.g., INHS 2005).

Habitat and occurrence within the GND

Forster's terns are noted in all core studies from coastal, estuarine and wetland habitats in the GND (Appendix D). They are common throughout the year (Table 6.4). Forster's terns were the most commonly observed tern by Kutilek et al. (1991). Burton and Kutilek (1991) and Kutilek et al. (1991) counted similar relative abundances of Foster's tern along the coast and at Oso Flaco Lake (Table 6.4).

Habitat in other areas

Forester's terns inhabit fresh- and saltwater wetlands, especially estuaries, coastal bays, and beaches. They are common in the interior states of the continental U.S. where they occur in various wetland and riparian areas.

Present status within the GND

These terns are commonly observed along the immediate coast and in estuaries, ponds and lakes in the GND throughout the year.

Life history

Forster's terns are found almost exclusively on the North American continent (Alderfer 2006). They breed in freshwater ponds, lakes and marshes, sometimes building floating nests, in the Midwest and in coastal and estuarine habitats along the Atlantic and Gulf coasts (Cogswell 1977; Martin and Zwank 1987). They also breed along the Pacific coast from Canada south to about San Francisco Bay (Martin and Zwank 1987). Most Forster's terns migrate to coastal areas to winter.

Forster's terns take a wider selection of prey items than other terns, perhaps because of their wide distribution in inland areas (Martin and Zwank 1987). Although they eat primarily fish, which they plunge into the water after, they are also known to take insects, such as dragonflies and grasshoppers, which they capture on the wing or on the water surface. Other prey includes bird eggs, young birds, frogs and carrion (Martin and Zwank 1987). Juvenile shiner perch and northern anchovy were the primary food found in the stomachs of birds captured at Elkhorn Slough, Monterey County, (Martin and Zwank 1987).

Potential effects of invasive plant species control methods

The current invasive weed control program in the GND cannot be expected to impact Caspian terns. Their diet is almost exclusively fish taken from lakes, estuaries or near shore coastal waters, all areas not treated with herbicides.

Literature cited

Alderfer 2006.

Cornell Lab of Ornithology. 2003i.

Cogswell, H. 1977.

INHS (Illinois Natural History Society). [www.inhs.uiuc.edu/]. Accessed July 2005.

Martin, R. and P. Awank. 1987.

Marbled murrelet — *Brachyramphus marmoratus*

Status

Marbled murrelet are a Category 1 special-status species (very sensitive). These birds are listed as federally threatened and as a California state endangered species. Primary threats include loss of nesting habitat with cutting of old-growth forests in the Pacific northwest (Kaufman 1996).

Habitat and occurrence within the GND

Marbled murrelets are known from the Pt. Sal area of northern Santa Barbara County (Lehman 1994). Point Sal is also listed as the southernmost extent of the breeding range of marbled murrelets (Sowls et al. 1980).

Habitat in other areas

Marbled murrelets occur in marine near-shore and pelagic habitats including coastal bays (Kaufman 1996). They are locally common in Alaska and British Columbia, Canada but generally not below Canada (Alderfer 2006). In their northern areas, they make extensive use of freshwater lakes in both breeding and non-breeding season (Carter and Sealy 1986). In San Luis Obispo County, a few marbled murrelets are observed every year between fall and spring from observation areas located on rocky headlands or around the mouth of coastal streams (MCAS 2004, 2005).

Present status within the GND

Unknown. Marbled murrelets are not known to nest at Pt. Sal in recent times (Lehman 1994). Occasional but regular sightings of the birds in other parts of San Luis Obispo

County suggest they may pass by the GND or may occur in the near shore waters off Pt. Sal.

Life history

Marbled murrelets eat mostly small fish including sand lance, capelin and herring but also take crustaceans including euphausids, mysids, crabs and amphipods and may also take squid (Kaufman 1996). They forage while swimming underwater in waters less than about 100 ft in depth, usually fairly close to shore (Kaufman 1996). In the winter during non-breeding season they forage in waters further from shore.

Little is known of their breeding as few sites have been observed (Kaufman 1996). They are solitary nesters, not colonial. Their nests are in trees, commonly old growth forests, up to 150 ft. above the ground (Audubon 2006). In Alaska, some nests are on rocky slopes near the ocean. Other breeding sites may be close to the ocean or up to 15 miles inland (Kaufman 1996).

Potential effects of invasive plant species control methods

Marbled murrelet have been observed in near shore, coastal waters of the GND. they are awkward on land and not expected to come ashore in the terrestrial or wetland areas of the GND. They are not expected to be affected by any invasive plant control measures currently in use in the GND

Literature cited

Audubon. 2006.

Carter, H., and S. Sealy 1986

Kaufman, K. 1996.

Lehman, P. 1994.

Sowls et al. 1980.

Black skimmer *Rhynchops niger*

Status

Black skimmer is a category 3 special-status species (of some concern) due to disturbances to nesting colonies that negatively affect their reproduction.

Most of the problems facing black skimmers occur around their nesting and roosting sites. Nesting sites on the East and Gulf coasts have been disturbed by a variety of man-caused disturbances as well as some natural disturbances such as storms and flooding (Sibley et al. 2001). However, their breeding sites have also been enhanced by humans as they readily use dredge-spoil islands, dykes, and man-made wetlands (e.g., the Salton Sea in California) as nesting sites. Their populations were reduced, primarily along the eastern and gulf coasts through the various causes including DDT (Sibley, et al. 2001) while at the same time their population (and their range) was increasing along the West Coast (Sibley, et al. 2001; Alderfer 2006).

Habitat and occurrence within the GND

Black skimmers have been reported flying along the sandy beaches of the GND by Morro Coast Audubon Society members a few times during summer months (MCAS 2004, 2005).

Habitat in other areas

In San Luis Obispo County, black skimmers have been reported along sandy beaches in Morro Bay, CA and off Point Piedras Blancas in spring months between February and May (MCAS 2004, 2005). Although they generally favor coastal saltwater environments protected from open surf in California, in other areas they are found on bays, tidal estuaries, large rivers and lakes, canals, ocean beaches and inlets (Farrand 1983).

Present status within the GND

Black skimmers observed in the GND are migrants or vagrants. Their population on the West Coast, particularly California, seems to be increasing and it seems as though these birds will be observed in flight along the GND beaches on a relatively regular basis in the future. There is no mention in the observations of these birds either feeding or sitting on the sand, only, apparently, in flight.

Life history

Unless otherwise noted, the majority of the information on black skimmer was obtained from the National Audubon Society website [www.audubon.org/bird/waterbirds/index.html].

Along the Pacific coast, black skimmers are resident from mid-Baja California, Mexico to southern California (Alderfer 2006) and incidental into Canada. In California, black skimmer breed in colonies on man-made dykes in the southern end of San Diego Bay and at the Salton Sea (Sibley, et al. 2001; Adlerfer 2006). In other parts of their range they breed on sandy beaches and islets as well as dredge spoil islands. Although they are very sensitive to disturbance in nesting colonies, their range is expanding in the west (Kaufman 1996).

Black skimmers feed mostly on small fish just below the surface of the water but may also take small crustaceans (Kaufman 1996). They feed on the wing using their highly modified lower mandible to furrow the water. Feeding is mostly by touch, not sight although they may forage by wading in very shallow water, scooping up fish (Kaufman

1996). They may feed late in the afternoon into the evening hours when the sea conditions are calmer.

Potential effects of invasive plant species control methods

Black skimmers are observed flying along the sandy beach of the GND. They have apparently not been observed feeding along the GND beaches, estuaries or freshwater wetland areas. Their likelihood that they would be exposed to any harmful effects because of the current methods used to control invasive plant species in the GND therefore seems remote.

Literature cited

Alderfer, J. 2006.

www.audubon.org/bird/waterbirds/index.html

Kaufman, K. 1996.

Sibley, D.A, Elphick, C., Dunning, JB (Eds). 2001.

6.4.4 Long-Legged Wading Birds

Bitterns, herons, and egrets are short-tailed birds with long legs and long, usually slender necks. These birds are migratory to some extent moving some distance between breeding areas and wintering areas. Many, however, are common at all times of the year in the GND and may be resident. The diet of these birds is other animals, predominately fish, but also insects, amphibians, snakes and lizards, small birds and rodents They are typically found in aquatic habitat although many, at some times, may forage in terrestrial habitats. Cattle egrets, for example, forage primarily in terrestrial habitats, often among grazing mammals.

Findings

In the GND, long-legged wading birds (Order Ciconiiformes) are represented by eight species of herons, egrets and bitterns (Family Ardeidae) and one species of ibis (Family Threskiornithidae), a rare, accidental fall visitor in the GND, found at the Santa Maria River mouth. Table 6.5 presents the abundance and seasonality of these birds. Their habitat types and references to their GND occurrence are presented in Appendix D. Appendix. E-1 presents two additional species that may be present but are not currently documented.

None of these species have been reported to nest in the GND. Burton and Kutilek (1991) report, however, observed juvenile great blue herons and black-crowned night herons foraging on all three lakes at Oso Flaco and assumed them to nest nearby. Smith et al. (1976) note that great blue heron, great egret and black-crowned night heron commonly roost in woodland trees along the southern edge of Pismo Marsh.

CONFIRMED LONG-LEGGED WADING BIRDS		Relative Abundance			Seasonal Observations				Breeding Locale
Scientific Name	**Common Name**	**Oso Flaco Lake**	**ODSVRA**	**GOF**					
Ardeidae	**Heron, Bittern**								
Ardea alba	Great egret	C	-	C (W, Sp)	Sp	Su	F	W	US to s. South America
Ardea herodias	Great blue heron	C	U	C (Res)	Sp	Su	F	W	**GND;** s. Canada to Mexico
Botaurus lentiginosus	American bittern	C	-	U (Res)	Sp	Su	F	W	Canada to Gulf States
Bubulcus ibis	Cattle egret	-	-	C (W)	Sp	Su	F		s. Eurasia, Africa, N & S America, Australia, Hawaii
Butorides virescens	Green heron	C	-	C (Res)	Sp	Su	F	W	**GND**, nw US, se Canada to Argentina
Egretta thula	Snowy egret	U	U	C (W)	Sp	Su	F	W	Northern US to Argentia
Ixobrychus exilis	Least bittern	-	-	R (M)	Sp		F	W	se Canada, US, n. Argentina
Nycticorax nycticorax	Black-crowned night heron	C	U	C (Res)	Sp	Su	F	W	**GND**, s Canada to Falklands, Eurasia, Africa, Pacific Isl.
Threskiornithidae	**Ibis**								
Plegadis chihi	White-faced ibis	-	-	R (M)		Su	F		western US to Argentina
UNCONFIRMED LONG-LEGGED WADING BIRDS									
Ciconiidae	**Stork**								
Mycteria americana	Wood stork	-	-	R (M)			F		Southern US to Argentina
Gruidae	**Crane**								
Grus canadensis	Sandhill crane [nr Guadalupe 79-80]	-	-	R (M)			F	W	ne Siberia, N. Amereica, Cuba

NOTES:

OSVRA	-- Oceano Dunes State Vehicular Recreation Area	Res	Resident	Sp	Spring
GOF	-- Guadalupe Oil Field	C	Common at some time	Su	Summer
GND	-- Breeding reported in Guadalupe-Nipomo Dunes	U	Uncommon, even when most abundant	F	Fall
-	-- Not observed; No data	R	Rare, even when most abundant	W	Winter
		M	Migrant		

Table 6.5 Confirmed and Unconfirmed Long-Legged Wading Birds

Potential effects of invasive plant species control methods

Many of these birds were formerly hunted for their plumage with nearly disastrous results for many species. Today, their populations are doing well although human-induced threats still exist including habitat loss, water pollution, and various air pollutants. Hydrocarbons (as pesticides) cause thinner eggshells that are susceptible to cracking and mercury has been found at high levels in the feathers of egrets (Burger and Gochfeld 1997). Given their generally aquatic habitat preferences and their preferred diet of mainly aquatic organisms, along with the fact that aquatic habitats are not treated in the GND with herbicides, these birds are not expected to show any negative effects due to current GND treatments to control invasive plant species.

Brief accounts of GND long-legged waders

Of the nine confirmed species of long legged waders, seven are special status species (Table 6-1) and will be described in more detail in the following sections. Two of the long-legged waders are not special-status species.

Cattle egret, *Bubulcus ibis*, a recent immigrant (1967 as referenced by Lehman 1994) reported only by Dames & Moore (1979) in winter. More recently, they have rarely been observed in the GND in fall (MCAS 2005). Most records from Santa Barbara County come from the Santa Maria Valley where they are usually seen in fields with cattle where they feed on insects and other prey kicked up when the cattle move.

Green heron, *Butorides virescens*, is a common resident as noted by Burton and Kutilek (1991). They frequent less open area than other herons. Green herons are important predators of fish and invertebrates.

Literature cited

Burger, J. and M. Gochfeld, 1997.

Cogswell, H.L. 1977.

Lehman, P.E. 1994.

Long-legged waders special-status species accounts

Table 6-1 presents the seven special-status long-legged wading bird species in the GND along with their special-status category. Of the seven, two are a Category 2 species (sensitive); the remainder are Category 3, - of some concern.

Great egret ***Ardea alba***

<u>Status</u>

Great egrets are a Category 3 special-status species, of some concern.

Wetland drainage has markedly reduced available habitat for great egrets. Many former nesting sites have been abandoned (Cogswell 1977) for unknown reasons but perhaps related to intrusions of humans into nesting colonies, which often causes parents to desert nests. Eggshell thinning from pesticides may reduce breeding success (Grandholm 2002-B052), but population numbers have been increasing since the ban on DDT was enacted.

<u>Habitat and occurrence within the GND</u>

Great egrets are commonly observed in wetland and estuarine habitats in the GND (Appendix D; Table 6.5). This includes freshwater marsh, coastal salt marsh, mudflats, and floodplain (grassland in SM River). Smith et al (1976) reported great egrets use woodland (riparian) areas along the southern edge of Pismo Marsh for roosting.

Great egrets are sympatric with other species of wading birds (Smithsonian 2004a). Researchers observe significant habitat overlap of great egrets with snowy egrets, and herons. The research indicates some level of habitat partitioning occurs, with great egrets preferring freshwater pools while other species prefer estuarine habitats. More overlap may occur in GND as several Ardeid species (e.g. *Ardea herodias*, great blue heron) are observed foraging in common areas with great egrets. Different diets, however, reduce competition among the egrets and herons.

Because of their large size, great egrets are readily visible. At Oso Flaco Lake, Burton and Kutilek (1991) observed 13 birds (out of 35,058) in 480 variable-circular plots (Table 6.4).

<u>Habitat in other areas</u>

The great egret is a common yearlong resident throughout California, except for high mountains and deserts. It can be found in all kinds of wetlands, both inland and along the coast, including marshes, floodplains, river margins, lakeshores, salt pans, estuaries, coastal swamps, mangroves and mudflats. They also occur in more terrestrial habitats, including open fields, agricultural land, rice fields and drainage ditches.

<u>Present status within the GND</u>

Great egrets are commonly observed in the GND wetlands. Surveys beginning in 1976 to present day monitoring at the GOF site report great egrets. Members of the Morro Coast Audubon Society regularly report great egrets in the GND (T. Edell, MCAS, written communication November 2004).

Life history

The characteristic long neck of great egrets allows them to use their bill as a harpoon for capturing prey. Their diet consists of small birds, insects, aquatic invertebrates, and amphibians. Frequently these large white birds can be found in fields and grassy areas stalking ground rodents. They are known to take endangered tiger salamanders.

After the fall molt, both male and female egrets grow long, flowing plumes that trail from the back, extending beyond the tail. During the post-breeding molt the display plumes are lost.

Great egrets return to communal, often mixed species, roost trees, commonly eucalyptus, every evening, leaving during daylight hours for foraging grounds. When nesting, they prefer to feed locally, but will travel far from the nesting colony if necessary, going distances up to 10 miles (Cogswell 1977). During nesting season, they will often breed in colonies mixed with great blue heron, snowy egret and other heron species. While the mortality rate is high for the young, wild birds have been known to live 10 to 20 years.

Other common names

Common egret. Although sometimes called the "great white heron", this is incorrect because the great white heron is actually a white morph of the larger great blue heron.

Literature cited

Cogswell, H.L. 1977.

Granholm, S. B052.

Grosset, A. 2004.]

IEP (Interagency Ecological Program). 1997.

Lehman, P.E. 1994.

Remsen, J. V., Jr. 1978.

Sauer, J. R., J. E. Hines, and J. Fallon. 2004.

Smithsonian 2004a.

Great blue heron *Ardea herodias*

Status

The familiar great blue heron, or GBH, the largest heron in North America (Sibley 2003), is a Category 3 special-status species.

GBH are not currently under any state or federal threatened or endangered species protection, and are not known to be in decline (IEP 1997). Although a common, widespread, highly adaptable species that thrives in a wide variety of habitats over a broad range, they may be sensitive to human activities when building nests and laying eggs. Generally it is not day-to-day human activity but novel sounds that frighten herons from nests and lead to abandonment (Heron Working Group 2001). A pressing conservation issue for the GBH is for sufficient undisturbed nest sites. Great blue herons are probably sensitive to pesticides and herbicides in nesting and foraging areas (Jackman and Scott 1975).

Habitat and occurrence within the GND

Great blue herons are commonly observed in wetland and estuarine habitats in the GND (Table 6.5; Appendix D). Smith et al. (1976) reported great blue herons use woodland (riparian) areas along the southern edge of Pismo Marsh for roosting.

Great blue herons are readily observed because of their large size and tendency to remain very still in both open water and terrestrial habitats. Burton and Kutilek (1991) reported 58 observations at Oso Flaco Lake (out of 35,058 total birds observed) in 480 variable-circular plots in 1990–91. Kutilek, et al (1991) report fewer encounters with GBH in the wetland habitats of the Oceano Dunes SVRA than in the wetland areas of Oso Flaco Lake.

Habitat in other areas

Adaptable and widespread, GBH are fairly common all year throughout most of California in a wide variety of habitats including sheltered, shallow bays and inlets, sloughs, marshes, wet meadows, and shores of lakes and rivers. They are less common along riverine and rocky marine shores, in croplands, pastures, and in mountains above foothills (Cogswell 1977). When feeding, they are usually seen in slow-moving or calm salt, fresh, or brackish water. Nesting colonies are typically found in mature forests, on islands, or near mudflats, and do best when they are free of human disturbance and have foraging areas close by.

Present status within the GND

Great blue herons are commonly observed in dunes wetlands. Bird surveys beginning in 1976 to present day monitoring at the GOF site (Unocal 1999-2004) frequently report GBH as do many member of the Morro Coast Audubon Society (T. Edell, MCAS, written communication November 2004).

Life history

A. herodias occurs throughout most of North America, including Alaska, Quebec, and Nova Scotia. The range extends south through Florida, Mexico and the Caribbean to South America, including the Galapagos Islands (Hill 2001). Although GBH are known to overwinter in bays along the Alaskan coast, many of these Alaskan birds do not survive harsh winters (Hill 2001).

The variable diet of great blue herons allows them to exploit a variety of habitats and enables them to winter farther north than most herons. Fish comprise nearly 75% of their diet which also includes amphibians, reptiles, invertebrates, small mammals, and other birds (Cogswell 1977; Granholm B051). Although they hunt predominantly by day, they may also be active at night. They are solitary or small-group foragers; males typically forage in shoreline areas while females and juveniles forage in more upland areas. Locally, some hunting occurs on land, with ground rodents, which they stalk slow and deliberately, making up a major portion of their winter diet.

Though sympatric with other species of wading birds, the great blue heron forms monospecific breeding colonies containing a few to several hundred pairs. Isolated pair-breeding is rare. Nest building begins in February usually situated high up in a tree. The male gathers sticks for the female who fashions them into a platform nest. Both parents incubate the 3-5 eggs for 25-29 days and regurgitate food for the young. The young can first fly at about 60 days although they return to the nest to be fed for another few weeks.

Other common names

GBH are sometimes called "Great White Heron," when a white color morph is found, usually in Florida.

Literature cited

Cogswell, H.L. 1977.

Granholm, S. B051.

Heron Working Group. 2001.

Hill, R. 2001.

IEP (Interagency Ecological Program). 1997.

Jackman, S. M., and J. M. Scott. 1975.

Remsen, J. V., Jr. 1978.

Sibley, D.A. 2003.

American bittern *Botaurus letiginosus*

Status

American bitterns are a category 3 special-status species.

American bitterns were formerly more common and widespread in coastal California (Garrett and Dunn 1981). Their population has declined due to the draining of marshes, human disturbance, and pesticides both in California and in other parts of their range. Overgrazing of emergent vegetation also is detrimental to the species. (Garrett and Dunn 1981). They are considered endangered by some Midwestern states.

Habitat and occurrence within the GND

American bitterns are noted in all core studies from the foredunes and wetland habitats in the GND (Appendix D). They are common throughout the year and are considered to be a resident species (Table 6.4). Nesting by these bitterns may be expected in the Oso Flaco Lake area but is not currently reported.

Habitat in other areas

In California, American bitterns are found almost exclusively in emergent vegetation in freshwater marshes and along the borders of ponds and lakes. They are usually concealed or otherwise roosting solitarily amidst tall, dense, emergent vegetation, on the ground, or near ground on a log, stump, or on emergent plants. American bitterns do not normally perch in trees (Cogswell 1977).

Present status within the GND

These bitterns are observed in estuaries, ponds and lakes in the GND throughout the year. MCAS members have noted them at OFL (MCAS 2004, 2005).

Life history

American bitterns are found in freshwater ponds, lakes, rivers, and marshes in coastal states; rarely in estuarine habitats (Cogswell 1977; Alderfer 2006). They rarely roost or nest much above ground level (Cogswell 1977). Although they may be short-distance migrants, they are a resident species along the California coast and inland areas (Alderfer 2006; Cogswell 1977).

American bitterns eat a variety of aquatic insects including water scorpions, giant water bugs, and dragonflies, crayfish, small fish and eels, adult and larval amphibians, reptiles such as garter snakes and small mammals (Cogswell 1977; Harris 1999). Prey items are taken in aquatic habitats either in or near standing water. The birds either stealthily stalk the prey item or, more commonly, stand still until the prey item is within striking distance.

The current invasive weed control program in the GND cannot be expected to impact American bitterns. Their diet is almost exclusively animal material taken from aquatic habitats, usually shallow water, all areas not treated with herbicides.

Literature cited

Alderfer 2006.

Cogswell, H. 1977.

Garrett, K. and J. Dunn. 1981.

Harris, M. 1999.

Snowy egret ***Egretta thula***

Status

Snowy egrets are a Category 3 special-status species.

The snowy egret is not currently under any state or federal threatened or endangered species protection, and is not known to be in decline (IEP 1997). While the population of snowy egrets in California appears to be increasing based on surveys conducted by Sauer et al. (2004), the population remains depressed due to early 20th century hunting for feathers and, more recently, losses of aquatic and wetland habitats.

Habitat and occurrence within the GND

Snowy egrets are commonly observed as winter migrants in wetland and estuarine habitats in the GND (Appendix D; Table 6.5). Smith et al. (1976) reported snowy egrets are permanent residents in GND wetlands. Birds may have been breeding at the Santa Maria River mouth in July 1980 (Lehman 1994).

Snowy egrets accounted for just 4 birds counted (out of 35,058) in 480 variable-circular plots by Burton and Kutilek (1991) at Oso Flaco Lake and only 2 (out of 23,329) in survey by Kutilek et al (1991) in the ODSVRA (Table 6.4).

Habitat in other areas

Though sympatric with other species of herons and egrets, the snowy egret is somewhat more variable in its habitat preferences, preferring shallow bays, coastal marshes and mangrove habitats over inland marshes and sloughs (Smithsonian 2004b). Snowy egrets share similar habitat with great egrets and great blue herons. However, there may be some level of habitat partitioning that occurs, with the large great egrets and great blue herons often foraging in somewhat deeper waters, while the smaller snowy egrets forage in shallower areas (Smithsonian 2004b).

Present status within the GND

Small numbers of snowy egrets are regularly observed in GND wetlands. Some are residents (Smith et al 1976) but most are winter migrants (Dames & Moore 1979). Snowy egrets are not uncommonly reported from the Oso Flaco Lakes by members of the Morro Coast Audubon Society (T. Edell, MCAS, pers. comm., November 2004).

Life history

In the United States, the range of the snowy egret extends throughout the continental United States from northern California to Maine, and south to Florida, the Gulf of Mexico, and much of South America. Snowy egrets on the west coast of the U.S. overwinter from California southward.

Snowy egrets are among the most common wading birds in the southern United States. They are a highly gregarious species, which breeds and feeds in mixed colonies, seldom in monospecific colonies, beginning in mid-March in the southern United States

Snowy egrets feed on a variety of invertebrates and fish.

Literature cited

CDF&G. 2004a. RareFInd 3.1.

Cogswell, H.L. 1977.

IEP (Interagency Ecological Program). 1997.

Lehman, P.E. 1994.

Sauer, J. R., J. E. Hines, and J. Fallon. 2004

Smithsonian. 2004b.

Least bittern *Ixobrychus exilis*

Status

The least bittern is a Category 2 special-status species.

Least bittern was originally on the Audubon's Blue List (1971 to 1986), which called attention to bird species that were declining or of conservation concern, but were not receiving any special attention. The Blue List In its current form, the Audubon Watch List of 2002 does not recognize concern for least bitterns (Audubon Society 2004).

The main factor for the decline in the numbers of least bitterns is loss of habitat due to the drainage of wetlands. Human disturbance during the nesting period is a second important limiting factor. Least bitterns are partially nocturnal and migrate at low altitude and are frequently killed, or injured, by collisions with cars and obstacles such as TV towers (Percivia 2004).

Habitat and occurrence within the GND

Least bitterns are observed on rarely occasions in wetland habitats in the GND (Appendix D; Table 6.5**)**. Smith et al. (1976) is the only author to report least bittern in the GND and found them to be permanent residents in freshwater marsh in the Dune Lakes vicinity. They inhabit fresh water marshes – reedy ponds- and are not easily flushed (Granholm B050).

Habitat in other areas

Least bitterns nest in freshwater marshes where tall, dense aquatic vegetation is interspersed with clumps of woody vegetation and open water (Cogswell 1977; Lehman 1994). In the northern part of their range, they are most strongly associated with cattails (*Typha* spp.). They occur more regularly in marshes that exceed 12 ac in area.

Present status within the GND

Members of the Morro Coast Audubon Society observe least bitterns on occasion near Oso Flaco Lake (T. Edell, MCAS, written communication November 2004).

Life history

The least bittern inhabits freshwater marshes, bogs and swamps with dense cattails, reeds, bulrushes, and other tall aquatic and semi-aquatic vegetation and prefers marshes with scattered bushes or other woody growth. They are less commonly found in coastal brackish marshes. Their renowned cryptic coloration and stealthy habits keep them hidden from predators and potential prey species.

Least bitterns eat small fish and large insects such as dragonflies and forage in deeper water with dense vegetation.

The least bittern nests in wetland areas throughout the eastern United States and along the Pacific coast (Oregon, California Central Valley; Cogswell 1977). Their nest is a platform of dead and live plant stems with a shallow hollow, placed about a foot above water, usually on the base of dried plants. Clutch size is four to five light blue to light green eggs. Incubation by both adults lasts between 17 to 20 days.

Recent synonyms

Ardetta exilis

Literature cited

Audubon Society. 2004.

Cogswell, H.L. 1977.

Granholm, S. B050.

Lehman, P.E. 1994.

Percivia 2004. [www.perciva.com].

Black-crowned night heron *Nycticorax nycticorax*

Status

Black-crowned night herons are a category 3 special-status species.

The primary problem facing black-crowned night herons is the cutting of roosting and nesting trees and the destruction of their wetland and estuarine feeding and nesting habitat (Granholm 2005-B059). Before it was banned in the 1970's, the pesticide DDT caused significant reductions in their numbers through reduced reproductive success.

Habitat and occurrence within the GND

Black-crowned night herons are noted in all core studies from coastal, estuarine and wetland habitats in the GND (Appendix D). They are common throughout the year (Table 6.5) and are considered to be residents. Although not directly observed nesting in the GND, Burton and Kutilek (1991) reported juvenile black-crowned night herons at Oso Flaco Lake and, because the young are not highly mobile, considered them to nest near by.

Habitat in other areas

Black-crowned night herons inhabit fresh- and saltwater wetlands, especially estuaries, coastal bays, and beaches. They are common in various wetland habitats in the interior states of the continental U.S. They roost in dense trees and large shrubs, not always near the water, in thick vegetation in emergent freshwater and brackish water wetlands, and are common sights on piers (Granholm 2005-B059). Adaptable and accommodating to humans, some colonies have persisted in large cities where their food came from debris-laden harbors or city park lakes (Cogswell 1977).

Present status within the GND

These herons are commonly observed along the immediate coast and in estuaries, ponds and lakes in the GND throughout the year. Thought to breed in the GND based on occurrence of young birds at Oso Flaco Lake.

Life history

Black-crowned night herons are found throughout North American in freshwater ponds, lakes, rivers and marshes inland and in coastal and estuarine habitats along the coasts (Alderfer 2006). They breed in the same areas in big trees, shrubs or on the ground (Cogswell 1977). Black-crowned night herons are residents along much of the California coast and inland areas (Cogswell 1977).

Although they eat primarily fish, black-crowned night herons take a wide selection of prey items. They are also known to take aquatic insects, such as dragonflies, crustaceans, crayfish, squid, mussels, young birds (e.g., ibis and terns), frogs, reptiles, small mammals (rarely) and carrion (Ivory 2002; Granholm 2005-B059). They are also known to take refuse and garbage from landfills (Ivory 2002). Plant material makes up a very small portion of the diet of black-crowned night herons. Prey items are taken by stealthily stalking them on foot, generally at night but also sometimes in daylight hours.

The current invasive weed control program in the GND cannot be expected to impact black-crowned night herons. Their diet is almost exclusively fish and other animal material taken from lakes, estuaries or nearshore coastal waters, all areas not treated with herbicides.

Literature cited

Alderfer 2006.

Cogswell, H. 1977.

Granholm 2005-B059.

Ivory, A. 2002.

White-faced ibis *Plegadis chihi*

Status

White-faced ibis are a Category 2 special-status species.

Recovery Plan: California Department of Fish and Game (1983) has several recommendations to help recover white-faced ibis including shallow flooding of key grassy areas and purchase of breeding habitat in particular areas within the state. (http://www.dfg.ca.gov/lands/wa/region6/sanjacinto.html).

Destruction of marsh habitat, especially along the southern coast and in the San Joaquin Valley, was perhaps the main factor responsible for declines of white-faced ibis. Their preferred habitat (shallow, grassy marshes) has either disappeared from most of

California or is allowed to go dry during spring and summer for mosquito and cattail control. However, white-faced ibis have vanished from suitable breeding habitat in California, implying that factors other than habitat destruction are involved (Remsen 1978). DDT contamination and resultant eggshell thinning may also be a factor in their reduced numbers (Remsen 1978). In recent statewide surveys, Sauer et al. (2004) document an upswing in their population.

Habitat and occurrence within the GND

White-faced ibis were reported only once in foredune and freshwater marsh habitat during Unocal Oil Field surveys (J.Schneider pers. comm.) (Table 6.5; Appendix D).

Habitat in other areas

White-faced ibis are found in freshwater marshes, borders of lakes, cultivated fields (especially when irrigated or flooded), irrigation canals and ditches, and very rarely saltwater marshes and estuaries (Small 1994).

Present status within the GND

White-faced ibis are rare visitors observed in the dunes wetlands. They have been sighted only in recent surveys in the GOF (J. Schneider, pers. comm.). Member of the Morro Coast Audubon Society also observe white-faced ibis on occasion (MCAS 2004, 2005).

Life history

White-faced Ibis occurs predominantly in the western half of North American, with breeding taking place mainly in the Great Plains and wintering to coastal Louisiana, Texas, southern California and throughout northern Mexico. They are rare but fairly regular visitors to the Hawaiian Islands (Birding Hawaii 2004). They are an uncommon summer resident in sections of southern California and a rare visitor in the Central Valley, but are more widespread in migration (Granholm B062).

They feed in fresh emergent wetland, shallow lacustrine waters, and muddy ground of wet meadows and irrigated, or flooded, pastures and croplands eating earthworms, insects, crustaceans, amphibians, small fishes, and miscellaneous invertebrates (Cogswell 1977). White-faced ibis roost in dense, fresh emergent vegetation. Extensive marshes are required for nesting where nests, made of dead tules or cattails, are built amidst tall marsh plants, sometimes on mounds of vegetation and rarely in trees (Cogswell 1977).

Literature cited

Birding Hawaii. 2004.

Cogswell, H.L. 1977.

Granholm, S. B062.

IEP (Interagency Ecological Program). 1997.

Lehman, P.E. 1994.

Remsen, J. V., Jr. 1978.

Sauer, J. R., J. E. Hines, and J. Fallon. 2004.

Small, A. 1994.

6.4.5 Smaller Wading Birds

Charadriidae	killdeer and plovers
Haematopodidae	oystercatchers
Recurvirostridae	avocets and stilts
Scolopacidae	sandpipers and snipe
Rallidae	rails

Findings

Forty-six (46) taxa of smaller wading birds are confirmed to occur in the GND with one unconfirmed species (Table 6.6; Appendix D). The vast majority of smaller wading birds are shorebirds in the Order Charadriiformes, among the most abundant birds in the GND. This group also includes three secretive, seldom observed species of rails in the Order Gruiformes. While most of the shorebirds migrate to the GND from northern breeding locations and occur seasonally, six species are known to breed in the GND: sora, Virginia rail, western snowy plover, killdeer, black-bellied plover, and black-necked stilt (Table 6.6).

Brief accounts of the shorebird families in the GND

Charadriformes is a large, diverse order that contains well known shore bird types such as plovers, sandpipers, and stilts and contains the terns and gulls, discussed earlier. Members of the following shore bird families occur in the GND.

Charadriidae killdeer and plovers

This family is represented by seven species in the GND: the common, resident killdeer and six migratory plovers including the threatened western snowy plover. Four of the seven GND species in this family are special-status. The killdeer is often seen at GND wetland habitats but not often near the shore.

Haematopodidae oystercatcher

Only one species in this family, the black oystercatcher, is found in the few rocky sections of the GND shoreline.

Recurvirostridae avocets and stilts

Recurvirostridae are represented by two species in the GND: black-necked stilt and American avocet. These wading birds have long, spindly legs and long slender bills either straight or curved upward. American avocet is commonly observed along GND shores.

Scolopacidae sandpipers and snipes

This family contains the majority of smaller wading birds that occur in the dunes with 33 confirmed species of sandpipers, curlew, phalaropes, stints, and snipes. Nine members of this family are special-status species. Most birds in this family are migratory, following coasts or waterways on their typically long migrations (Alderfer 2006). Several are accidental strays (overshoots in migration) from Asia. Most forage near the water's edge, with some foraging in the water or forest floor (Alderfer 2006). Invertebrates are their normal prey, which they capture with their generally long bills by probing in the soft substratum and are as active at night as they are during the day (Sibley et al. 2001).

Rallidae coots and moorhens

In addition to the American coot and common moorhen (Section 6.4.2), confirmed rail species in the GND are the black, sora, and Virginia rails; the federal and state endangered clapper rail is unconfirmed in the GND. These birds are observed in wetlands and marshes, often, as with the Virginia rail, in the densest marsh vegetation.

CONFIRMED SMALLER WADING BIRDS		Relative Abundance			Seasonal Observations				Breeding Locale
Scientific Name	**Common Name**	**Oso Flaco Lake**	**ODSVRA**	**GOF**					
Rallidae	**Rail**								
Laterallus jamaicaensis	Black rail	R	-	R (M)				W	ne-cen US (CA) , W. Indies, Chile
Porzana carolina	Sora	C	-	Res	Sp	Su	F	W	**GND**; Canada, US to Peru
Rallus limicola	Virginia rail	C	-	U (Res)		Su	F	W	**GND**; s. Canada to s. So. America
Haematopodidae	**Oystercatcher**								
Haematopus bachmani	Black oystercatcher	-	-	U (Res)		Su	F		Coasts of world + Eur-Asia
Charadriidae	**Plover**								
Charadrius alexandrinus nivosus	Western snowy plover	Incidental	C	C (Res)		Su	F	W	**GND**; so. US, S. Am. Eurasia Af
Charadrius montanus Charadrius	Mountain plover	-	-	U (M)			F	W	Western Great Plains
semipalmatus Charadrius	Semipalmated plover	-	-	C (W)		Su	F	W	Arctic and subarctic America
vociferous	Killdeer	C	R	C (Res)	Sp	Su	F	W	**GND**; s. Alas, Can - Mex - Peru
Pluvialis dominica	American golden-plover	-	-	R (M)	Sp	Su	F		arctic America
Pluvialis fulva	Pacific golden plover	-	-	R (M)	Sp		F		n. Siberia and nw. Alaska
Pluvialis squatarola	Black-bellied plover	Incidental	C	C (W)	Sp	Su	F	W	**GND**, Arctic; circumpolar
Recurvirostridae	**Avocet, Stilt**								
Himantopus mexicanus	Black-necked stilt	-	-	C (Res)	Sp	Su	F	W	**GND**, w & se. US to Argentina
Recurvirostra americana	American avocet	-	R	C (Res)	Sp	Su	F		sw Canada, western US
Scolopacidae	**Sandpiper, Snipe, Phalarope**								
Actitis macularia	Spotted sandpiper	R	-	U (W)	Sp	Su		W	Alaska, Canada to cen US
Aphriza virgata	Surfbird	-	-	U (W)		Su		W	Alaska, Yukon
Arenaria interpres	Ruddy turnstone	-	-	C (W)		Su	F		Arctic, subarctic, circumpolar
Arenaria melanocephala	Black turnstone	-	-	C (W)		Su			Alaska
Calidris acuminata	Sharp-tailed sandpiper	-	-	R (M)			F		n. Siberia
Calidris alba	Sanderling	Incidental	C	U (S), C (W)		Su	F		Arctic; circumpolar
Calidris alpina	Dunlin	C	U	C (W)		Su	F	W	Arctic; circumpolar
Calidris bairdii	Baird's sandpiper	-	-	R (M)	Sp	Su			ne Siberia & N. American Arctic
Calidris canutus	Red knot	-	-	R (M)		Su	F		Arctic; circumpolar
Calidris fuscicollis	White-rumped sandpiper	Incidental	-	R (M)		Su?			Arctic North America
Calidris himantopus	Stilt sandpiper	-	-	R (M)	Sp	Su	F		Alaska-Canada Arctic tundra
Calidris mauri	Western sandpiper	C	C	U (S), C (W)	Sp	Su	F	W	Alaska
Calidris melanotos	Pectoral sandpiper	-	-	U (M)	Sp	Su			Siberia & American Arctic
Calidris minutilla	Least sandpiper	U	-	U (S), C (W)	Sp	Su		W	Alaska, Canada
Calidris pusilla	Semipalmated sandpiper	-	U	R (W)		Su	F	W	North American Arctic
Calidris ruficollis	Red-necked stint	-	-	R (M)		Su			Eurasian,Alaska [Pt. Barrow]
Catoptrophorus semipalmatus	Willet	U	C	U (S), C (W)	Sp	Su	F	W	Canada to Gulf of Mexico, W. Indies

Table 6.6 Confirmed and Unconfirmed Smaller Wading Birds

CONFIRMED SMALLER WADING BIRDS (continued)		**Relative Abundance**			**Seasonal Observations**				**Breeding Locale**
Scientific Name	**Common Name**	**Oso Flaco Lake**	**ODSVRA**	**GOF**					
Scolopacidae (continued)	**Sandpiper, Snipe, Phalarope**								
Gallinago delicata	Wilson's (common) snipe	U	-	C (W)	Sp		F		n. North America, n Eurasia
Heteroscelus incanus	Wandering tattler	-	-	R (M)		Su			nw. North America
Limnodromus griseus	Short-billed dowitcher	R	-	U (S), C (W)	Sp	Su	F	W	s. Alaska, Canada
Limnodromus scolopaceus	Long-billed dowitcher	C	-	U (S), C (W)	Sp	Su		W	ne Siberia to nw Canada
Limosa fedoa	Marbled godwit	-	C	U (S), C (W)	Sp	Su	F		n. Great plains, sw Alaska
Numenius americanus	Long-billed curlew	C	C	C (W)	Sp	Su			sw Canada, w US
Numenius minutus	Little curlew	-	-	R (M)		Su			n . Siberia
Numenius phaeopus	Whimbrel	-	C	C (W)	Sp	Su			Arctic, circumpolar
Phalaropus fulicarius	Red phalarope	-	-	U (M)	Sp	Su		W	Arctic, circumpolar [pelagic]
Phalaropus lobatus	Red-necked phalarope	C	-	C (M)	Sp	Su	F	W	Circumpolar [winters at sea]
Phalaropus tricolor	Wilson's phalarope	-	-	C (M)	Sp	Su	F		sw Canada, w US & Great Lakes
Philomachus pugnax	Ruff	-	-	R (M)		Su	F	W	n. Eurasia
Tringa flavipes	Lesser yellowlegs	-	R	U (W)		Su		W	Alaska, Canada
Tringa melanoleuca	Greater yellowlegs	U	-	U (W)	Sp		F		Alaska, Canada
Tringa solitaria	Solitary Sanpiper	-	-	R (F), U (Sp)	Sp				Alaska, Canada
Tryngites subruficollis	Buff-breasted sandpiper	-	-	R (M)			F		nw. Arctic

UNCONFIRMED SMALLER WADING BIRDS		**Relative Abundance**			**Seasonal Observations**				**Breeding Locale**
Scientific Name	**Common Name**	**Oso Flaco Lake**	**ODSVRA**	**GOF**					
Rallidae	**Rail**								
Rallus longirostris	Clapper rail	-	-	R	-	-	-	-	US coasts (CA) to n. So. America

NOTES:

OSVRA	-- Oceano Dunes State Vehicular Recreation Area	Res	Resident	Sp	Spring
GOF	-- Guadalupe Oil Field	C	Common at some time	Su	Summer
GND	-- Breeding reported in Guadalupe-Nipomo Dunes	U	Uncommon, even when most abundant	F	Fall
-	-- Not observed; No data	R	Rare, even when most abundant	W	Winter
		M	Migrant		

Table 6.6 Confirmed and Unconfirmed Smaller Wading Birds (continued)

Potential effects of invasive weed control methods

Like other bird families in the GND impacts from current weed control measures are largely unknown. Because smaller wading birds generally occur near the shoreline where there are no weed eradication efforts, there are likely no direct impacts. However, birds that feed at the mouth of the Santa Maria River may be exposed to residual toxins (e.g. DDT) that still occur in concentrations similar to that before they were banned for use in the United States in the 1970's (Dugan 2005).

The diet of most of these birds is a variety of invertebrates taken in a variety of manners (visual, probing, gleaning). Most species eat mainly aquatic invertebrates but terrestrial forms such as spiders may be eaten in the warmer months along with vegetable matter, including grass seeds (Sibley 2001). These birds are largely associated with wetlands and, with a few exceptions, forage in them or in open areas nearby. Weed eradication efforts in GND wetlands are usually directed at pampas grass and arundo and the methods are very specific to the targeted plant. Some smaller wading birds may be in these wetlands and, although they would not be directly sprayed, they might eat some prey that has been sprayed. Due to the small area of GND wetlands that are sprayed with herbicides, impacts to birds are assumed to be minimal. Smaller wading birds may be more likely to be impacted from pesticide drift or run-off from neighboring agricultural fields near the GND.

Literature cited

Dugan, J. 2005.

Sibley et al. 2001

Small waders special-status species accounts

Species accounts are given for 15 of the smaller wading bird special-status species (Table 6.1; Appendix D). Of these species, two are Category 1 (most sensitive) and two are Category 2 (sensitive) and the remaining 11 species are Category 3 (of some concern).

Black rail ***Laterallus jamaicaensis***

Status

Black rails are a Category 1 special-status species (very sensitive).

Threats to the black rail include loss and degradation of its habitat due to water and flood-control projects, land-use changes, agriculture, and livestock grazing (CDFG 2000). Significant loss of saltwater and freshwater wetland habitat in recent decades has reduced population sizes. Loss of wetlands around San Francisco Bay apparently has eliminated breeding in the south bay area (Harvey 1983-B143).

The population status of the California black rail as of 1999 is unknown (CDFG 2000).

Habitat and occurrence within the GND

The rare sightings of black rails in the GND (Table 6.6) have been in wetland habitats near Oso Flaco Lake (Burton and Kutilek 1991; Rob Burton, Moss Landing Marine Lab, personal communication, 24 November 2004).

Habitat in other areas

Black rails occur most commonly in tidal emergent wetlands dominated by pickleweed, or in brackish marshes supporting bulrushes with pickleweed. In freshwater, this rail is usually found in bulrushes, cattails, and saltgrass. Black rails are usually found in immediate vicinity of tidal sloughs (Harvey 1983-B143). Typically, black rails occur in the high wetland zones near the upper limit of tidal flooding, not in low wetland areas where water levels fluctuate (CDFG 2000). Sibley et al (2001) explains that these are rare species, found in grassy fresh and brackish marshes and are virtually never seen in the open.

Present status within the GND

The black rail is a rare winter migrant observed only a few times at Oso Flaco Lake wetlands (Burton and Kutilek 1991) and also reported in estuarine habitat by Smith et al. (1976). There are no reports of recent observations (T. Edell, written communication Nov. 2004).

Life history

The diet of this carnivorous species consists of isopods, insects, amphipods, small mollusks, and other invertebrates, which it gleans from the surface of mud and vegetation (Harvey 1983-B143; CDFG 2000)

Little is known about the breeding behavior of this species. Nests are well hidden in clumps of vegetation, and are often slightly elevated from the ground (Sibley et al. 2001). Nests with eggs reported from 12 March to 4 June (Bent 1926, Wilbur 1974a cited in Harvey 1983-B143). Both sexes seem to incubate the eggs, and to brood chicks for a short period of time after hatching (CDFG 2000). Clutch size in California averaged six eggs; range = 3-8 (Dawson 1923, Wilbur 1974a cited in Harvey 1983-B143). The birds are reported to abandon nest if disturbed before completing clutch.

Predators include great blue herons, great egrets, northern harriers, short-eared owls and mammals such as domestic cats and foxes (Harvey 1983-B143).

Potential effects of invasive plant species control methods

With the exception of control of arundo and pampas grass, wetland areas where black rails are likely to occur are not treated for invasive weeds. Treatment for these two species is generally mechanical removal and some highly specific application of herbicides, neither of which can be expected to adversely affect black rails.

Subspecies

Two subspecies inhabit North America, the “Eastern” black rail (*Laterallus jamaicensis jamaicensis*) and “California” black rail (*L. j. cotorniculus*). The "California" subspecies is believed to be resident, while the eastern subspecies is believed to migrate to the southern part of its range (Florida and along the Gulf Coast) in winter.

Literature cited

Bent, A. C. 1926.

California Department of Fish and Game, 2000.

Harvey, T. 1983-B143.

Sibley, D.A, Elphick, C., Dunning, JB (eds). 2001.

Wilbur, S. R. 1974.

Black oystercatcher ***Haematopus bachmani***

Status

Black oystercatchers are a Category 3 special-status species (of some concern)

Much of the black oystercatcher text is a direct quote or modified from the Audubon Society (2002-036) webpage [http://audubon2.org/webapp/watchlist/viewSpecies.jsp?id=36].

The small population size of black oystercatchers places them at risk to large-scale disturbances, such as oil spills. The 1989 Exxon Valdez oil spill in Prince William Sound, Alaska, killed twenty percent of the population in the spill area, breeding activity was disrupted in 39% of the oystercatcher pairs attempting to nest and the survival of chicks was reduced (Sharp, Cody, and Turner 1996).

Most conservation management for black oystercatchers is on a local level. This species is dependent on marine invertebrates and other marine food items, and protection of water quality in feeding areas is an important conservation issue. Because of their limited population, areas that host high numbers of breeding or wintering black oystercatchers should be identified and conserved (Audubon Society 2002-036).

Habitat and occurrence within the GND

In San Luis Obispo County, black oystercatchers are found almost exclusively along the rocky coastline between Shell Beach and Hazard Canyon, although they are occasionally seen at the Santa Maria River Mouth (Marantz 1986). Lehman (1994) reported several pairs of black oystercatcher nests on the rocks near Pt. Sal State Beach. They are considered resident species at the GOF (Table 6.6).

Habitat in other areas

Black oystercatchers are found in rocky intertidal areas along almost the entire Pacific Coast of North America, from southern Alaska to Baja California. While mainly sedentary; some individuals exhibit post-breeding wandering. At rocky coastal habitat, black oystercatcher is sometimes associated with surfbird, black turnstone, and rock sandpiper (Audubon 2002-036).

Present status within GND

Black oystercatchers occur incidentally in the GND. Although their presence is recognized, reports of their occurrence in the GND is sporadic perhaps due to the limited observations in rocky intertidal marine habitat in the GND.

Life history

Black oystercatchers feed mostly on mussels, but its diet also includes limpets, whelks, and other marine organisms found on rocky shores (Hahn 1982). It forages primarily at low tide, resting at high tide. Black oystercatchers nest almost exclusively on islands. The nest is a scrape placed in gravel, a grassy area, or a depression in rock. Both sexes incubate a typical clutch of 2-3 eggs, which hatch after about four weeks. Downy chicks remain near their nest at first, with one parent guarding the young while the other forages nearby. Eventually, young birds are led by their parents to feeding areas, but they continue to be fed by the adults until after they are capable of flight at five weeks of age (Audubon 2002-036).

Potential effects of invasive plant species control methods

Although they have been observed at the mouth of the Santa Maria River, the preferred habitat of black oystercatchers is the rocky intertidal areas. Within the GND, these areas occur only at Mussel Rock and Point Sal, neither area of which is treated for invasive weeds.

Literature cited

Audubon Society. 2002-036.

Hahn, Thomas P. 1982.

Lehman, P.E. 1994.

Marantz, C. 1986.

Sharp, B. E., M. Cody, and R. Turner. 1996.

U.S. Shorebird Conservation Plan. 2004.

Western snowy plover ***Charadrius alexandrinus nivosus***

Status

Western snowy plovers are a Category 1 special-status species (very sensitive).

Julie Schneider provided much of the text on snowy plovers from an in-house document prepared while consulting to Unocal at the Guadalupe Oil Field.

The Pacific Coast population of the western snowy plover was federally listed as Threatened under the federal Endangered Species Act in 1993. In December 1999, the USFWS proposed a critical habitat designation for the Pacific Coast population of snowy plover. The delineation covered 28 critical habitat areas, including the Guadalupe-Nipomo Dunes area. Areas of proposed critical habitat include the beach strand and foredune up to the 40-foot contour. The western snowy plover is not listed by the State of California, but is classified by CDFG as a Special Concern Species.

There are a variety of factors impacting the drastic decline of this subspecies of snowy plover. Human use of nesting beaches is considered the greatest factor in the decline of the coastal population of snowy plovers. Unfortunately the period of heaviest human beach use coincides with the species' breeding season. Typical human beach activities, such as walking, jogging, and sunbathing, can cause birds to abandon their nests leaving eggs and chick vulnerable to predation and exposure to the elements (wind and sand). Trash left behind at beaches contributes to an increase in predation by attracting more predators, such as crows and ravens, to an area.

The Division of Endangered Species, U.S. Fish and Wildlife Service issued numerous proposed and final listing decisions, critical habitat designations, recovery plans, policies and other announcements to protect this species within 50-miles of the Pacific coast (USFWS 2006a).

A draft recovery plan has also been prepared (USFWS 2001b). The primary objective of this recovery plan is to remove the Pacific coast western snowy plover population from the List of Endangered and Threatened Wildlife and Plants by: (1) achieving well-distributed increases in numbers and productivity of breeding adult birds, and (2) providing for long-term protection of breeding and wintering plovers and their habitat

(USFWS 2001b). The recovery plan goals aim to maintain, for 10 years, an average of 3,000 breeding adults distributed among six coastal recovery units ranging from Washington and Oregon to San Diego County, California, which include 1,200 breeding adults in San Luis Obispo and Ventura Counties.

USFWS is conducting a status review of the Pacific Coast population of the western snowy plover, to comply with two petitions to de-list the species and to comply with the requirement that species status be reviewed in five-year intervals. USFWS expects to complete that review in spring 2007 (USFWS 2006b).

<u>Habitat and occurrence within the GND</u>

The snowy plover breeds in the beach and foredune habitats of the GND. The nest sites range from the flat areas of foredunes to further inland in the less vegetated parts of dunes, although this is generally considered marginal habitat.

<u>Habitat in other areas</u>

The Pacific coast population of western snowy plovers breeds primarily above the high tide line on coastal beaches, sand spits, dune-backed beaches, sparsely-vegetated dunes, beaches at creek and river mouths, and salt pans at lagoons and estuaries. Less common nesting habitats include bluff-backed beaches, dredged material disposal sites, salt pond levees, dry salt ponds, and river bars. In winter, snowy plovers are found on many of the beaches used for nesting as well as on beaches where they do not nest, in man-made salt ponds, and on estuarine sand and mud flats (USFWS 2001b).

Sand spits, dune-backed beaches, unvegetated beach strands, open areas around estuaries, and beaches at river mouths are the preferred coastal habitats for nesting. Nest sites typically occur in flat, open areas with sandy or saline substrates; vegetation and driftwood are usually sparse or absent. Nesting habitat is unstable and ephemeral as a result of unconsolidated soil characteristics of the beach sands and dunes influenced by high winds, storms, wave action, and colonization by plants. Their nest and eggs are extremely cryptic; thus protecting them from predation, but also making them susceptible to being accidentally crushed by humans. The majority of western snowy plovers are site-faithful, returning to the same breeding site in subsequent breeding seasons. Birds often nest in exactly the same locations as the previous year.

The Pacific Coast western snowy plover population is defined as those individuals that nest adjacent to or near tidal waters, and includes all nesting colonies on the mainland coast, peninsulas, offshore islands, adjacent bays, and estuaries. It is genetically isolated from western snowy plover that breed in the interior. The Pacific coast population of the western snowy plover breeds in loose colonies primarily on coastal beaches from southern Baja California, Mexico to southern Washington.

Present status within the GND

Research on the western snowy plover study was undertaken by the GOF–Guadalupe Restoration Project to determine the factors that influence nesting site selection. The information gleaned from the study was incorporated into the design of restored foredune areas to make them more suitable for nesting plovers. The 2000–2003 plover study results indicate that the restored foredunes are providing good nesting habitat for the plovers (Unocal 2004). Many areas of the GND are closed to hiking in the spring and summer months to project breeding snowy plovers. The continuing success of the snowy plover recovery programs by all GND managers is born out by the breeding success of western snowy plovers in the GND reported by the authors of all reports consulted in this project.

Life history

Some birds winter in the same areas used for breeding, while other birds migrate either north or south. The coastal population, therefore, consists of both resident and migratory birds. The breeding season of the coastal population of western snowy plovers extends from mid-March through mid-September. Nest initiation and egg laying occurs from mid-March through mid-July. The usual clutch size is three eggs and incubation averages 27 days. Both sexes incubate the eggs. After hatching the males continue caring for the chicks. Their chicks are precocial, leaving the nest within hours after hatching to search for food. Fledging (reaching flying age) requires an average of 31 days. Broods rarely remain in the nesting territory until fledging. Instead, broods will roam the beach strand and foredune areas for forage. When approached or disturbed, they will "hunker down" and stay motionless, relying on camouflage for protection. Before the young are able to fly they are highly vulnerable to predation and trampling.

After the loss of a clutch or brood or successful hatching of a nest, a pair may nest one or two more times in the same colony site. They may also move, sometimes up to several hundred miles, to other colony sites to nest. The males will usually wait until they have successfully raised the brood before attempting a second clutch. Double brooding and polygamy (the female successfully hatches more than one brood in a nesting season with different mates) have been observed in coastal California. This breeding strategy can contribute to rapid population recovery as long as there is sufficient protected habitat.

Potential effects of invasive plant species control methods

The protection of snowy plovers was, and remains, among the most important issue in developing the invasive weed control methods currently in use in the GND in two ways. First, removal of European beach grass from the foredunes will create more potential nesting sites in their preferred nesting habitat. Second, the scheduling of the control efforts revolves around their breeding season, with work in the foredune nesting area completed in the non-breeding period between October 1 and March 1 each year and more interior work done on veldt grass performed during their breeding period of March 1 to September 30.

Literature cited

Unocal. 2004.

U.S. Fish and Wildlife Service. 2001b.

U.S. Fish and Wildlife Service (USFWS). 2006a.

U.S. Fish and Wildlife Service (USFWS). 2006b.

Mountain plover — *Charadrius montanus*

Status

Mountain plover are a Category 2 special-status species (sensitive) due to their low population size, habitat specificity, and tendency to occur in large flocks.

Mountain Plover, *Charadrius montanus*, was proposed for listing under the federal Endangered Species Act by the U.S. Fish and Wildlife Service in 1999, but was withdrawn in 2003 (Dinsmore 2003). The U.S. Fish and Wildlife Service (2003b) found that declines in local population numbers at specific locations were not supported by statewide estimates throughout the range, which suggest that the continental population had not changed significantly in the past decade (USFWS 2003b).

Formerly abundant in California on native grasslands, the abundance of mountain plovers declined with the decline in these grasslands (Hunting 2000). The current continental population is approximately 8,000 to 10,000 birds. Available data suggest they are experiencing a significant long-term decline as a result of a loss of nesting habitat, habitat alterations due to the loss of primary grazers, and a possible reproductive sink created by plovers nesting on agricultural land (Dinsmore 2003).

Habitat and occurrence within the GND

Mountain plovers are a rare migrant in the GND (Table 6.6). Marantz (1986) reports a single bird present on 26 September 1980 at the Santa Maria River Mouth. Walter Wehtje (Unocal consulting biologist, personal communication December 2004) and Unocal (1999-2004) also reported observations of mountain plover at the Santa Maria River estuary. The species is an accidental vagrant and more typically found as a winter migrant to the Carrizo Plains (Marantz 1986).

Habitat in other areas

Mountain plovers nest in the western Great Plains from Montana south to New Mexico and into Mexico, and winter from Texas west and north to the Central Valley of California (Dinsmore 2003). In winter, they use nearly barren or very sparse native grassland, alkali playas, burned or heavily grazed sites, and plowed or disked agricultural lands for foraging and roosting (Hunting 2000).

Over 90% of the North American population winter in California where important areas include the western San Joaquin and outer coastal valleys and the southern Sacramento valley (Dinsmore 2003).

Present status within the GND

Mountain plovers are rarely observed in the GND.

Life history

The mountain plover is a migratory bird that undergoes an annual, short distance migration between its northern breeding grounds and wintering grounds farther south (e.g. Imperial Valley). Flocks of mountain plover range widely in search of large insects (especially grasshoppers) and other invertebrates (Hunting 2000).

The mountain plover is apparently highly susceptibility to pesticides and other contaminants due to its proximity to aerial spraying and ground applications on agricultural lands on both breeding and wintering grounds. Direct impacts from pesticide application and indirect effects of reducing the insect prey base, are suspected as factors in this species range-wide decline (Hunting 2000).

Prairie falcons (*Falco mexicanus*) and coyotes (*Canus latrans*) are common associates of wintering mountain plovers and are likely predators (Hunting 2000).

Potential effects of invasive plant species control methods

Mountain plovers could potentially ingest some of the larger insects, such as grasshoppers, that may have been contacted with herbicide applied to invasive plant species in the GND. However, their ingestion is not expected to be harmful to the birds as the metabolic pathway affected by these herbicides is not present in birds or other vertebrates.

Literature cited

Dinsmore, S.J. 2003

Hunting, Kevin. 2000

Marantz, C. 1986.

U.S. Fish and Wildlife Service (USFWS). 2003b

American golden-plover ***Pluvialis dominica***

Status

American golden-plovers are a Category 3 special-status species (of some concern).

Audubon Society WatchList: yellow.

Much of the American golden-plover text is a direct quote or modified from the Audubon Society (2002-011) and Audubon Society Seattle BirdWeb (2002-136) webpages.

Once numbering in the millions in the US, recent broad-scale surveys give a rough estimate of 150,000 golden plovers. Hunting, once extensive, has virtually stopped but habitat destruction across the winter range makes recovery to its original population levels unlikely (Audubon Society 2002-011). Intensive agriculture, urbanization, tourism, and ranching compete with the golden-plovers' migratory routes and winter range habitat. They are exposed to a large array of agrochemicals during migration and on its wintering grounds but how these pesticides effect their populations is virtually unstudied. In 1979, eight birds of this genus were collected in Alaska and showed relatively high levels of DDE and PCBs. Fortunately, most of its far northern breeding range is still relatively undisturbed (Audubon Society 2002-011).

Habitat and occurrence within the GND

American golden-plover are a rare fall transient and very rare winter and spring transient to the coastal areas of San Luis Obispo County including the GND (Table 6.6). The estuarine habitat at the Santa Maria River Mouth (SMRM) is the only location where this species regularly [in small numbers] occurs in the county. About three-fourths of the records involve fall migrants along the immediate coast. Early fall transients can occur as early as mid-August with one sighting at SMRM in September, 1984 (Marantz 1986).

Habitat in other areas

The main breeding range and habitat is arctic and subarctic tundra from northeast Manitoba across Canada to and central Alaska. The principal winter range for this species is the pampas grasslands of South America where suitable habitat has been dramatically reduced to accommodate human interests, notably industrial agriculture and cattle ranching (Audubon Society 2002-011). During spring and fall migrations between these areas, American golden-plovers use a variety of habitats including coastal mudflats and estuaries, adjacent salt marshes and agricultural fields (Audubon Society Seattle BirdWeb 2002-136). They prefer areas with very low-lying, sparse vegetation (Sibley et al. 2001).

Present status within the GND

Recent reports indicate this species is found at estuarine habitats at the SMRM (Unocal 1999-2004; W. Wehtje, personal communication December 2004). These birds seem to have been more frequently observed in the 1980's than they are currently (see Marantz 1986).

Life history

American golden-plovers are migratory, flying from the top of the North American continent to the lower half of the South American continent two times each year. A portion of their population, the ones likely to be observed in the GND, flies south along the Pacific coast in the fall while the majority flies over the east coast then over the open Atlantic Ocean to South America. On the northward spring migration, the majority of the birds fly up central America, across the Gulf of Mexico and enter the continental US in Texas and Louisiana.

Their diet consists of small mollusks, crustaceans, polychaete and oligochaete worms, and a variety of adult and larval terrestrial and aquatic insects. American golden-plovers are specialized feeders that use vision to locate their prey, unlike tactile probing of sandpipers (Scolopacidae). Their feeding strategy is highly stereotyped and involves running for a short distance then stopping with head held high, scanning the surface for movement, which elicits a quick peck at the prey (Sibley et al. 2001). Berries are an important food item in the spring and fall (Audubon Society Seattle BirdWeb 2002-136) and they may maintain seeds in their digestive tract to help them survive long migratory flights (Audubon Society 2002-011).

Potential effects of invasive plant species control methods

Although the effects, if any, of the invasive species controls currently used in the GND are largely unknown for American golden-plovers, we expect there to be little exposure to potentially harmful effects to these birds. These plovers prefer sparsely vegetated areas, such as plowed agricultural fields, and prefer very low stature vegetation. None of these areas are subjected to invasive weed control methods in the GND. The main area where they are known to occur, at the mouth of the Santa Maria River, is not treated. Cattle grazing in that area may be of benefit to the plovers by keeping the grass at the short stature most preferred by these birds.

Literature cited

Audubon Society. 2002-011.

Audubon Society (Seattle Bird Web). 2002-136.

Dugan, J. 2005.

Marantz, C. 1986.

Sibley, D.A, Elphick, C., Dunning, JB (eds). 2001.

Pacific golden-plover *Pluvialis fulva*

Status

Pacific golden-plover are a Category 3 special-status species (of some concern) due to its low relative abundance, and threats during both breeding and non-breeding seasons (Audubon Society 2002-155).

Much of the Pacific golden-plover text is a direct quote or modified from the Audubon Society (2002-155) webpage [http://audubon2.org/webapp/watchlist/viewSpecies.jsp?id=155].

Human populations are rapidly expanding over much of the *P. fulva* winter range. Much of the Pacific golden-plover migratory flyways and winter habitat are intensively farmed, ranched, and along with urbanization, expose the birds to an array of agrochemicals. They winter in high densities on Hawaiian golf courses where it comes in contact with potentially hazardous chemicals. The effect of pesticides on this species is mostly unstudied. In 1979, eight birds of this genus collected in Alaska showed relatively high levels of DDE and PCBs (Audubon Society 2002-155).

Habitat and occurrence within the GND

Pacific golden-plovers are rare migrants in the GND (Table 6.6), occasionally observed in estuarine and wetland habitats (Unocal 1999-2004, Entrix Inc. 1996, T. Edell and W. Wehtje personal communication, 2004). Previously, when this species was considered a subspecies of the lesser golden-plover (*P. dominica*), Marantz (1986) reported, “a bird judged to be of the [P]acific subspecies, *P. d. fulva*, [was observed] at Arroyo Grande Creek mouth on 22 October 1982.”

Habitat in other areas

Migrating Pacific golden-plovers are typically found in coastal habitats such as mudflats, estuaries, and open ocean beaches. They nest on arctic and subarctic Alaskan tundra, and may winter on islands in the Pacific Ocean as far south as Australia. Some portion of the population goes no farther for the winter than California beaches (Audubon Society Seattle Bird Web 2002-137).

Present status within the GND

A recent study by Johnson and Johnson (2004) indicates, “in field situations involving molting birds and birds in non-breeding plumage, unequivocal species identification may be impossible in some cases.” Despite this warning, an August 2005 sighting of a molting adult Pacific golden-plover was reported on the SLO County side of the Santa Maria River mouth (MCAS written communication, October 2005). Otherwise, this species is rarely observed in the GND.

Life history

Pacific golden-plovers share sympatric breeding grounds with the closely related American golden-plover in the North American and Russian tundra (Audubon Society 2002-155). They nest in habitats that range widely from dense vegetation and moist forest-tundra in lower elevations and in dry, open gravel and lichens in the higher elevation nesting areas (Audubon Society 2002-155).

The winter range of this species is spread out over about half of the world's circumference. It occupies upland and coastal habitats ranging from Hawaii to Japan, from the South Pacific through southern Asia and the Middle East to northeast Africa. It also winters in specific areas of coastal California, and probably in Baja California, the Revillagigedo and Galapagos Islands, and Chile as well (Audubon Society 2002-155).

In the winter range in coastal California, these plovers are found in coastal salt marshes, sandy beaches, and around ponds. In the Pacific, they occupy mangroves, fields, clearings in heavily wooded areas, airport runways, military bases, golf courses, cemeteries, athletic fields, and residential lawns. In tropical wintering grounds, deforestation and cultivation actually provides habitat for this species, especially in heavily altered areas like Hawaii and India. Its great adaptability to these areas may cause it harm over the long-term, especially in heavily contaminated habitat (Audubon Society 2002-155).

Food items include terrestrial invertebrates, berries, leaves and seeds as well as some freshwater and marine invertebrates, and the occasional small vertebrate. This plover may be capable of maintaining seeds in its digestive tract to help it survive its long migratory flights (Audubon Society 2002-155).

Potential effects of invasive plant species control methods

Essentially the same as for American golden-plovers above.

Other common names

Pacific lesser golden-plover

Literature cited

Audubon Society. 2002-155.

Audubon Society (Seattle Bird Web). 2002-137.

Johnson, O.W. and Johnson, P.M. 2004.

Marantz, C. 1986.

Surfbird *Aphriza virgata*

Status

Surfbirds are a Category 3 special-status species.

Much of the surfbird text is a direct quote or modified from the Audubon Society (2002-198) webpage [http://audubon2.org/webapp/watchlist/viewSpecies.jsp?id=198].

Surfbirds are undergoing a suspected population decline due to factors including their limited breeding distribution, their vulnerability to oil pollution, and expanding development in their coastal wintering range (Audubon Society Seattle Bird Web 2002-163). Sibley et al (2001) suggests that concerns regarding surfbirds, among other, relate to their small population sizes, limited distribution and propensity for a large segment of the species to gather at a very few staging areas during migration, rather than documented declines in population. The Canadian Wildlife Service estimates the surfbird population at 70,000 birds.

Habitat and occurrence within the GND

Surfbirds are reported from beach, dune strand and estuarine habitats in the GND (Smith et al. 1976; T. Edell written communication 2004). These habitats are somewhat atypical for these birds, however, and they may be more common on the few rocky intertidal areas within the GND. They are reported as uncommon in winter at the GOF (Table 6.6).

Habitat in other areas

Surfbirds spend their entire lives in rocky areas. They breed in the rocky mountain tundra of Alaska and the Yukon, and migrate to rocky coastal shores. In winter, they are almost always within a few meters of the tidal line. They sometimes forage in non-rocky areas, but this is unusual (Audubon Society Seattle Bird Web 2002-163).

Present status within the GND

Surfbirds have not been recently observed in the GND probably due to the limited observations along the few areas of rocky coast within the system.

Life history

The summer diet in inland breeding areas, mostly windswept rocky tundra, consists primarily of insects, spiders, and other invertebrates but some seeds. In rocky coastal areas during non-breeding and migration periods, they eat mussels, barnacles, and limpets and other invertebrates (Audubon Society Seattle Bird Web 2002-163). Rarely will they feed on mudflats or sandy beaches (Sibley et al. 2001).

This species perhaps has the longest wintering range, in terms of degrees of latitude occupied, of any bird in the world, occurring along almost the entire Pacific Coast of the

Americas, from southeastern Alaska to Tierra del Fuego in southern Chile (Alderfer 2006). In breeding season, the surfbird is found in mountain ranges scattered throughout Alaska and the Yukon Territory (Audubon Society 2002-198).

Potential effects of invasive plant species control methods

Current methods used to control invasive species in the GND are not expected to affect surfbirds. Their preferred rocky habitat occurs only at Pt. Sal and Mussel Point in the GND, neither of which is treated for invasive species near the rocky intertidal areas. Although they may rarely forage in sandy beaches and mud flats, these areas are likewise not treated.

Literature cited

Alderfer, J. 2006.

Audubon Society. 2002-198.

Audubon Society (Seattle Bird Web). 2002-163.

Sibley, D.A, Elphick, C., Dunning, JB (eds). 2001.

Black turnstone *Arenaria melanocephala*

Status

Black turnstones are a Category 3 special-status species (of some concern) based on relative abundance, threats on breeding grounds, threats on non-breeding grounds, and most importantly, its very small breeding distribution.

Much of the text on black turnstone is a direct quote or modified from the Audubon Society (2002-189) webpage [http://audubon2.org/webapp/watchlist/viewSpecies.jsp?id=189].

The entire population of black turnstone, numbering approximately 80,000 birds, breeds in a narrow stretch of coastal plain in western Alaska. In Prince Williams Sound, Alaska, a major spring staging site for black turnstone, the Exxon Valdez oil spill caused extensive contamination of turnstone prey items. How this may have impacted the black turnstone population was not studied, however, Christmas Bird Count data suggest that winter populations of black turnstone in the Pacific Northwest may have decreased (Audubon Society 2002-039).

Habitat and occurrence within the GND

Black turnstones are reported from GND beach, dune strand, and possibly estuarine habitats (Smith et al. 1976; Entrix, Inc. 1996; Unocal 1999-2004; T. Edell written communication, 2004). Although not directly observed during their study in the GND, Dames & Moore (1979) indicates black turnstone are common winter visitors.

<u>Habitat in other areas</u>

A coastal species at all times of the year, black turnstones nest in the wet tundra of coastal Alaska, often near estuaries or lagoons. They migrate and winter along the rocky shorelines of the Pacific Coast. They are most often found foraging on rocky shores, jetties, and islets but will also forage on top of kelp beds (Audubon Society Seattle Bird Web 2002-162). Black turnstones also forage around piles of beach wrack in search of insects attracted to the rotting kelp (Mendocino Coast Audubon Society 2003).

<u>Present status within the GND</u>

Black turnstones are an infrequent visitor to the GND beaches. For example: at the Santa Maria River Estuary, two or three black turnstones were seen on August 27, 2000 (Morro Coast Audubon Society, written communication, 2005). Studies at the Guadalupe Oil Field, however, indicate that black turnstones are common winter residents (Table 6.6).

<u>Life history</u>

Black turnstones breed in western Alaska and winter along the entire North American Pacific Coast from southern Alaska to Baja California. Black turnstones are strictly a coastal species, migrating and wintering along the rocky shorelines. Along the rocky coast, black turnstones forage among rocks, using its short, pointed bill to pry or hammer open food items like barnacles and limpets. On beaches, it turns over rocks, shells, and seaweed in search of food, thus its name (Audubon Society 2002-189; Audubon Society Seattle BirdWeb 2002-162).

<u>Potential effects of invasive plant species control methods</u>

Control methods currently in use in the GND are unlikely to impact black turnstones. Their preferred habitat is rocky shores and although those observed in the GND were along wet beach and estuarine areas, these areas are generally not treated for invasive plants. During the summer months, they would be protected by the same procedural measures taken to avoid impacts to snowy plover by the weed control program.

<u>Literature cited</u>

Audubon Society. 2002-189.

Audubon Society (Seattle Bird Web). 2002-162.

Mendocino Coast Audubon Society (2003).

Red knot *Calidris canutus*

Status

Red knots are a Category 3 special-status species (of some concern) based on declining population trends and threats on non-breeding grounds.

Much of the red knot text is a direct quote or modified from the Audubon Society Seattle Bird Web (2002-165) and Audubon Society (2002-173) webpages.

The red knot's propensity for gathering in huge flocks at traditional staging areas makes it vulnerable to habitat degradation and destruction, and, in South America, to hunting pressure (Audubon Society 2002-173). Over-harvesting of horseshoe crabs on the East Coast has resulted in the loss of a crucial food supply during migration (Audubon Society Seattle Bird Web 2002-165). The Canadian Wildlife Service estimates the global population of *C. canutus* at 1,290,000 birds, with 400,000 in North America.

Habitat and occurrence within the GND

Red knot is reported from beach and dune strand habitats in the GND (Smith et al. 1976; Entrix, Inc. 1996; Unocal 1999-2004; M. Smith, MCAS written communication 2004).

Habitat in other areas

Red knots migrate through and winter along shorelines around the world. Large sandy estuaries and tidal flats are most preferred (Audubon Society Seattle Bird Web 2002-165). On its migration and on its wintering grounds, red knot are often found on coastal mudflats and tidal zones, as well as occasionally on sandy beaches around the world (Audubon Society 2002-173).

Present status within the GND

Red knots are an infrequent visitor to GND beaches in summer and fall (Table 6.6), but are sighted on a regular basis. At the Santa Maria River Estuary, 3 to 21 red knots were seen in August and September, 2000 (MCAS, 2000).

Life history

In the tundra, red knots feed by sight, picking food from the surface. On tidal flats, they probe for food with their bills (Audubon Society Seattle BirdWeb 2002-165). They eat insects (especially flies) as well as plant matter, especially early in the season before many insects are out. Small invertebrates including mollusks, crustaceans, and marine worms are part of the diet during migration and winter. Migrating birds in the eastern US feed heavily on the eggs of horseshoe crabs (*Limulus* spp.), which are deposited in the billions along sandy beaches (Audubon Society Seattle Bird Web 2002-165).

Red knots breed in the far north, mostly above the Arctic Circle in both North America and Eurasia. Breeding grounds are often inland from the coast, and usually near a pond or stream where they prefer high, barren, inland areas of moist tundra and glacial till. The nest is on the ground, usually near water (Audubon Society Seattle Bird Web 2002-165).

Potential effects of invasive plant species control methods

Current control methods are unlikely to impact red knots in the GND. Their preferred habitat is sand and mudflats (Cogswell 1977) where they were observed in the GND and which are not treated for invasive plants. During the summer months, they would be protected by the same procedural measures taken to avoid impacts to snowy plover by the weed control program.

Literature cited

Audubon Society. 2002-173.

Audubon Society (Seattle Bird Web). 2002-165.

Cogswell, H. 1977.

Short-billed dowitcher ***Limnodromus griseus***

Status

The short-billed dowitcher is a Category 3 special-status species (of some concern) based on population trends and threats on the non-breeding grounds.

Much of the text on short-billed dowitcher is a direct quote or modified from the Audubon Society (2002-186) webpage [http://audubon2.org/webapp/watchlist/viewSpecies.jsp?id=186].

The eastern breeding population of short-billed dowitcher has shown a significant population decline, while central Canadian breeders are also apparently declining. Loss of wetland habitats used by the species as migratory stopover locations continues to be a threat across much of the U.S. In some locations, the use of potentially lethal pesticides during the migration period is a threat (Audubon Society 2002-186).

Migrating short-billed dowitcher use areas in the United States that are part of National Wildlife Refuges where, for the most part, management practices protect habitat, ensure the availability of necessary resources, and minimize (Audubon Society 2002-186).

Habitat and occurrence within the GND

In SLO County, short-billed dowitchers are a common transient along the immediate coast and may be found at virtually any coastal lagoon, with Santa Maria River Mouth (SMRM) and Morro Bay being preferred locations (Marantz 1986). Lehman (1994) confirms the SMRM estuarine habitat use by migrating dowitchers.

In addition to beach and estuarine habitats, short-billed dowitchers were also reported to occur in riverine and wetlands habitats in the GND (Smith et al. 1976; Dames & Moore 1979; Burton and Kutilek 1991; Entrix, Inc. 1996; Unocal 1999-2004). Burton and Kutilek (1991) saw one bird in their quantitative surveys near Oso Flaco Lake and Unocal (1999-2004) reported dowitchers in coastal dune scrub habitat.

Habitat in other areas

During migration and winter, short-billed dowitchers are usually found near salt water on mud flats and tidal marshes. They can sometimes be found in fresh water at the muddy edges of ponds. They breed in open marshes and bogs in the boreal forest zone, usually inland, but close to fresh water (Audubon Society Seattle Bird Web 2002-180).

Present status within the GND

Short-billed dowitchers continue to be seen in the GND and appear to be more abundant in the winter (Table 6.6). They were sighted on 28 October 2003 at Pismo State Beach (MCAS, 2003).

Life history

Until recently, short-billed and long-billed dowitchers were considered to be a single species. Great care must be taken in identifying these two species, which can be found foraging together on mudflats (Audubon Society 2002-186).

Short-billed dowitchers breed mostly on open bogs, marshes, and lake edges in the coniferous forest of Canada and Alaska. On the breeding grounds, they feed mostly on insects and insect larvae. During migration and in their wintering grounds, they prefer protected coastal tidal flats where they feed primarily on invertebrate infauna such as mollusks, marine worms, and crustaceans but may also take insects. They capture prey by probing in the substratum with their beaks. Short-billed dowitchers are rather distinctive in their "sewing machine" foraging habit, in which they wade in shallow water and probe deeply and repeatedly in the mud with their sizable bills.

Potential effects of invasive plant species control methods

Current control methods are unlikely to impact short-billed dowitchers in the GND. During the summer months, they would be protected by the same procedural measures taken to avoid impacts to snowy plover by the weed control program. During the winter, the birds are observed in marine and freshwater wetlands, areas generally subjected to very limited invasive species control activity.

Literature cited

Audubon Society. 2002-186.

Audubon Society (Seattle Bird Web). 2002-180.

Lehman, P. 1994

Marantz, C. 1986.

Marbled godwit ***Limosa fedoa***

Status

Marbled godwits are a Category 3 special-status species (of some concern) based on population trends, and threats on breeding and non-breeding grounds.

Much of the text for this marbled godwit section is a direct quote or modified from the Audubon Society (2002-129) and Audubon Society Seattle BirdWeb (2002-160) webpages.

Partners in Flight's Bird Conservation Plan for the Northern Mixed-grass Prairie, an area that supports almost 25% of the global population of marbled godwit, treats them as among their highest-priority species. Protection from hunting has helped the population rebound, but the destruction of grassland breeding habitat now limits the population (Audubon Society Seattle BirdWeb 2002-160). The Canadian Wildlife Service estimates the population at 171,500 birds.

Several programs are aimed at conservation of marbled godwits. Among them are Audubon's San Francisco Bay Restoration Program [www.AudubonSFbay.org], working to restore half of the estuary's wetlands and associated habitats that provide a key migratory stopover site for large numbers of marbled godwits (Audubon Society 2002-129).

Habitat and occurrence within the GND

In the GND, *L. fedoa* form a major population of winter migrants; with some permanent residents year-round (Smith et al. 1976). In addition to observations in beach and estuarine habitats, marbled godwits were also reported to occur in other dune wetland habitats (Dames & Moore 1979). Burton Kutilek (1991) did not report marbled godwits near Oso Flaco Lake, but Kutilek et al. (1991) enumerated 168 bird observations in their quantitative surveys near Oceano Dunes SRVA. Unocal (1999-2004) reported these birds in coastal dune scrub habitat.

In SLO County marbled godwits first appear along the immediate coast in early July, becoming quite common by the middle of the month (Marantz 1986). Most of the wintering birds have departed by mid-April, with some stragglers remaining in the marsh around Morro Bay. The primary wintering area in the County is in Morro Bay, but large concentrations also occur at the SMRM and Arroyo Grande Creek Mouth (Marantz 1986). Lehman (1994) confirms the SMRM estuarine habitat use by migrating birds.

Habitat in other areas

Marbled godwits nest in native prairie habitats that comprise wet meadows and grassy areas near water. During migration and in winter they inhabit coastal areas, foraging on mudflats, salt marshes, estuaries, and freshwater pools along the coast. Most marbled godwits winter in coastal California or Mexico, but range as far as South America (Audubon Society Seattle BirdWeb 2002-160). Well over 90 percent of the California populations of marbled godwits are associated with tidal areas (Cogswell 1977).

Present status within the GND

Marbled godwits continue their strong presence in the SMR estuary, as well as, on the GND beach and dune strand habitats (Table 6.6; numerous reports from MCAS birders, 2001-2005).

Life history

The major breeding population of marbled godwit nests in the prairies of the Great Plains, in native grasslands near marshes or ponds. The nest is on the ground, in a dry spot in short grass. In late summer they migrate to the wintering areas, ranging from coastal California south to Mexico and rarely South America. In migration, they remain primarily coastal, on sheltered bays and lagoons, beaches and mud flats, but may also occur on lake margins and open coasts (Farrand 1983). Non-breeding birds may spend summer in their winter range.

On the breeding grounds, insects such as grasshoppers are a major source of food along with spiders and larvae and pupae of midges, crane flies and muscid flies (Sibley et al 2001). Wintering ground habitat is almost exclusively coastal, but may include other wetlands, where various invertebrates including mollusks, worms, crustaceans, and other invertebrates, captured primarily by probing with their long beak, make up the bulk of their diet (Audubon Society 2002-129).

Literature cited

Audubon Society. 2002-129.

Audubon Society (Seattle Bird Web). 2002-160.

Cogswell, H. 1977.

Farrand, J. 1983.

Lehman, P.E. 1994.

Marantz, C. 1986.

Long-billed curlew *Numenius americanus*

Status

Long-billed curlews are a Category 2 special-status species (sensitive).

Much of the long-billed curlew text is a direct quote or modified from the Audubon Society (2002-124) webpage [http://audubon2.org/webapp/watchlist/viewSpecies.jsp?id=124].

The largest shorebird in North America, long-billed curlews are considered highly imperiled by several conservation organizations based on population trends, relative abundance, threats on breeding grounds, and threats on non-breeding grounds (Audubon Society 2002-124). The tendency of long-billed curlews to form large flocks during migration and on their wintering grounds makes them vulnerable to both human-induced and natural catastrophes (Audubon Society 2002-124). Their major threat is the loss and/or degradation of their native grassland breeding habitat; in the Great Plains, 30% of its historical breeding habitat has been lost to date. Many staging and wintering areas along the Pacific coast of the United States have been degraded or eliminated by development. Recent development has created a new threat to important shorebird sites on the west coast of Mexico.

Several programs are aimed at conservation of long-billed curlew. Montana's Bird Conservation Plan designates long-billed curlew as a "Monitoring Species”. The Partners in Flight Nevada Working Group selected long-billed curlews for priority consideration in their bird conservation plan

Habitat and occurrence within the GND

Long-billed curlew is a common transient and winter migrant along the coast of San Luis Obispo County between mid-August and mid-April (Marantz 1986). Marantz suggested that coastal birds probably forage primarily inland.

Long-billed curlews are common in the GND (Table 6.6). The reported habitats include beach, dune strand (by all authors), estuarine (Smith et al. 1976; Entrix, Inc. 1996), foredune (Entrix, Inc. 1996), coastal dune scrub (Unocal 1999-2004), and wetland (Dames & Moore 1979).

Habitat in other areas

Long-billed curlews have a rather widespread wintering range, occurring along both coasts of Florida, the Gulf Coast of Texas and Mexico, and along the Pacific Coast from Washington south through Mexico to Honduras (Audubon Society 2002-124). In these coastal wintering areas, long-billed curlews occur in wetlands such as marshes, mud flats, sand bars and other shorelines (Farrand 1983). They occur in grasslands of the Great Plains during the summer breeding season.

Present status within the GND

Long-billed curlews are common and continue to be observed frequently in the GND beach and estuary habitats (Table 6.6; MCAS, 2001-2005). The timing of the curlews in the GND (common in winter and frequent in spring and summer) suggests that they use the GND beaches as a wintering area and also migrate through on their way north or south.

Life history

Long-billed curlews are among the largest shorebirds in North America, easily identified by their large size and extremely long (up to 8 inches in length), down curved bills. These large birds breed mainly in the native grasslands of arid western North America, and are often found in farm fields and grasslands during migration and on their wintering grounds (Audubon Society 2002-124).

In summer, earthworms and other invertebrates are common prey. Berries may also be important food at certain times of the year. In winter, the long bill length allows the curlews to forage in coastal marshes and mudflats where smaller shorebirds with smaller bills cannot. Curlews use their incredibly long bills in a variety of ways: to pick up food items on the ground, to probe slightly under the surface of soil or mud or to probe deep into mudflats or sandflats following the burrows of fiddler crabs, crayfish and other crustaceans (Audubon Society 2002-124; Sibley et al. 2001).

Literature cited

Audubon Society. 2002-124.

Audubon Society (Seattle Bird Web). 2002-157.

Cogswell, H.L. 1977.

Farrand, J. 1983.

Sibley, D.A, C. Elphick, and J. Dunning (eds). 2001.

Whimbrel *Numenius phaeopus*

Status

The whimbrel, *Numenius phaeopus*, is a Category 3 special-status species (of some concern).

Much of the whimbrel text is a direct quote or modified from the Audubon Society (2002-213) webpage [http://audubon2.org/webapp/watchlist/viewSpecies.jsp?id=213].

Whimbrels, related to the probably extinct Eskimo curlew, have shown declines that may be related to destruction of coastal wetlands along its winter range (Audubon Society 2002-213). Still hunted in some areas in South America, the loss of wetland habitat is their greatest current challenge. Environmental contaminants like cadmium may also be a problem (Audubon Society 2002-213).

Habitat and occurrence within the GND

All core authors, except Burton and Kutilek (1991), report the presence of whimbrels in the GND habitats. These include beach, dune strand (all reporting core authors), estuarine (Smith et al. 1976; Entrix, Inc. 1996), and wetland (Dames & Moore 1979) habitats.

Habitat in other areas

Whimbrels nest in the tundra, not far from the tree line, in a variety of open habitats from wet lowlands to dry uplands. During migration, they use wetlands, dry, short grasslands, farmland (especially plowed fields), and rocky shores. In their winter areas, they are mostly found in coastal areas, on exposed reefs, sandy or rocky beaches, estuaries, and especially mudflats (Audubon Society Seattle Bird Web 2002-140).

Present status within the GND

Whimbrels continue to be observed frequently in the GND beach and estuary habitats (Table 6.6; MCAS, 2001-2005; G. Greenwald, pers. comm., 2006). In a pattern similar to that for the long-billed curlew, the timing of whimbrel occurrence in the GND suggests that they use the GND beaches as a wintering area and also migrate through on their way north or south.

Life history

Whimbrels breed in summer months in subarctic and alpine tundra and taiga (i.e., boreal forest; Sibley et al. 2001). Its habitat ranges from dry heath uplands to mossy lowlands and wet taiga bogs with scattered, stunted black spruce and dwarf-shrubs with an abundance of berries (Audubon Society 2002-213).

Whimbrels fatten up during the fall migration at coastal and terrestrial habitats such as heaths and oyster banks. During the winter along beaches and coastal wetlands, they forage in tidal flats, mangroves and a variety of other coastal habitats. Their main food is marine infaunal invertebrates such as annelid worms, clams, crabs, and shrimp, which they capture by probing with their long bills. Fiddler crabs (*Uca* spp.) are an important food during winter, and the shape of the whimbrels bill matches the curve of the crab's burrow (Audubon Society Seattle BirdWeb 2002-140). When foraging along tideflats and beaches, whimbrels often associate with willets and marbled godwits (Cogswell 1977).

Potential effects of invasive plant species control measures

Whimbrels are not expected to be impacted by the current invasive plant management practices in the GND for two primary reasons. First, the marine and freshwater wetland areas where these birds occur are only very lightly treated, if at all, for invasive species. Secondly, their primary food in the GND consists of infauna invertebrates which they capture from beneath the surface of the sand or at mud foraging areas. These animals would not be exposed to herbicide application as currently applied to plants in the GND.

Other common names

Hudsonian curlew

Literature cited

Audubon Society. 2002-213.

Audubon Society (Seattle Bird Web). 2002-140.

Cogswell, H.L. 1977.

Sibley, D.A, C. Elphick, and J. Dunning (eds). 2001.

Wilson's phalarope ***Phalaropus tricolor***

Status

Wilson’s phalarope is a Category 3 special-status species (of some concern).

Much of the Wilson's phalarope text is a direct quote or is modified from the Audubon Society (2002-218) webpage [http://audubon2.org/webapp/watchlist/viewSpecies.jsp?id=218].

The Canadian Wildlife Service estimates the population of Wilson's phalaropes at 1,500,000 birds. Much of their prairie breeding habitat has been lost due to the destruction and draining of marshes. These birds are adaptable, however, and are known to shift breeding ranges away from degraded areas and take advantage of new habitat. Concentrating in a few major staging areas during migration also puts them at risk. Their site fidelity to these migration staging areas is high and they do not seem to be as flexible about them as they are in breeding areas. The protection of staging area lakes such as Mono Lake in California and the Great Salt Lake in Utah is important to maintain the species at its current numbers (Audubon Society Seattle BirdWeb 2002-184).

Habitat and occurrence within the GND

Wilson's phalarope is an uncommon spring transient but a more common fall transient (Table 6.6). Although Marantz (1986) reported that Wilson's phalarope is almost exclusively restricted to fresh water, they have been sighted in estuarine, as well as, wetland habitats in the GND (Dames & Moore 1979; Unocal 1999-2004).

Habitat in other areas

Unlike the other two phalarope species, which are considered pelagic species, Wilson's migrates primarily over land to their winter grounds. They inhabit inland wetland areas. During migration, they inhabit shallow ponds, flooded fields, mudflats and can be found in small numbers on salt water. Wilson's phalaropes winter on large, shallow ponds and saline lakes in southern South America (Audubon Society Seattle Bird Web 2002-184).

Present status within the GND

Juvenile Wilson's phalaropes were reported recently from estuarine habitat at the SMRM, (T. Edell written communication 25 July 2005) and adults from wetland habitats at Oso Flaco Lake (MCAS, August 2004). Based on the timing of their occurrences, various wetland habitats in the GND appear to serve as stop over sites for Wilson's phalarope migrating both north and south.

Life history

Wilson's phalaropes breed on the grassy shores of lakes, reservoirs and marshes from central Canada to the southwestern United States (Alterfer 2006). In these areas they feed almost exclusively on aquatic invertebrates from zooplankton to immature and adult insects but are also known to capture prey while walking around on hard ground (Alderfer 2006; Sibley et al. 2001).

Prior to leaving the breeding grounds for South America, these birds gather in huge flocks at several staging areas to fatten up for the upcoming flight. Mono Lake in California and the Great Salt Lake in Utah are two such places where Wilson's will gorge on brine shrimp and brine flies, sometimes eating so much they cannot walk (Sibley et al. 2001). On migration they feed in marine and freshwater wetland areas on a variety of invertebrates such as fly and mosquito larvae, beetles, crustacea and sometimes small fish (Audubon Society Seattle Bird Web 2002-184; Cogswell 1977). Phalaropes use a distinctive foraging technique while swimming in open water. They spin in tight circles on the surface to create an upwelling plume of water that transports small prey items up to the surface where the bird can reach them (Sibley et al. 2001). Foraging on land is apparently fairly restricted to sites located near the edges of wetlands.

Potential effects of invasive plant species control measures

Wilson's phalaropes are not expected to be impacted by the current invasive plant management practices in the GND for two primary reasons. First, the marine and freshwater wetland areas where these birds occur are only very lightly treated, if at all, for invasive species. Secondly, they capture their prey items primary from bodies of water. These potential prey animals would not be exposed directly to herbicide application as currently applied to plants in the GND.

Literature cited

Alderfer, J. 2006.

Audubon Society. 2002-218.

Audubon Society (Seattle Bird Web). 2002-184

Cogswell, H.L. 1977.

Sibley, D.A, Elphick, C., Dunning, J.B. (eds). 2001.

Buff-breasted sandpiper *Tryngites subruficollis*

Status

Buff-breasted sandpiper are a Category 3 special-status species (of some concern) based on population trends, relative abundance, threats on non-breeding grounds, and non-breeding distribution.

Much of the buff-breasted sandpiper text is a direct quote or modified from the Audubon Society Seattle BirdWeb (2002-178) and Audubon Society (2002-052) webpages.

There is concern for buff-breasted sandpiper that human development has increased disturbance and brought more predators, both of which are significant threats (Audubon Society Seattle BirdWeb 2002-178). This sandpiper often uses agricultural habitats during its migration through the central U.S. and is potentially vulnerable to agricultural pesticides. With an estimated population of just 15,000 individuals, they are especially vulnerable to habitat loss on the wintering grounds in Argentina and Bolivia (Audubon Society 2002-052).

Habitat and occurrence within the GND

Sightings of buff-breasted sandpipers are very rare in the GND (Table 6.6) with just two confirmations. California Bird Record Committee (CBRC) web page [www.wfo-cbrc.org/cbrc/index.html] indicated a confirmed record at Guadalupe, Santa Barbara County on 6 September 1987. A more recent report places a bird in estuarine habitat on GOF (Unocal 1999-2004; W. Wehtje, personal communication, December 2004).

<u>Habitat in other areas</u>

Buff-breasted sandpipers breed in dry Arctic tundra. Outside of the breeding season, they are seen in short-grass prairie and other grassland habitats. They winter in the grasslands of southern South America. In migration, they can be found on grassy areas such as golf courses, cemeteries, mowed lawns, and airfields. They are often seen in the baked mud around drying rivers, lakes, and reservoirs and also along sandy beaches and open, weedy meadows (Audubon Society Seattle BirdWeb 2002-178).

<u>Present status within the GND</u>

Due to the rarity of this species in the GND, their status is uncertain.

<u>Life history</u>

Buff-breasted sandpiper breeds on dry, sloping tundra, or in areas of tundra with a combination of dry elevated areas and lower wet patches (Audubon Society 2002-052). The diet of buff-breasted sandpiper is not well known, but it appears to consist mostly of adult insects (Audubon Society 2002-052; Sibley et al. 2001).

Most buff-breasted sandpipers migrate from Arctic breeding grounds across the Great Plains, to the Pampas of southern South America and back. In the fall, it appears that most adults also migrate via the Central Flyway, while juveniles spread out across the United States, many reaching the East Coast and some spreading west to the Pacific (Audubon Society Seattle BirdWeb 2002-178). During spring migration, buff-breasted sandpiper is seen almost exclusively along the Central Flyway of North America, moving northward through the Great Plains. On migration, this species favors dry, grassy habitat, such as short-grass prairie, pastures, airports, and plowed fields. It is sometimes referred to informally as a "grasspiper," because of its preference for grassy areas over the coastal mudflats favored by most shorebirds. During the winter, the species is found predominantly in the wet grasslands of Argentina's pampas.

<u>Potential effects of invasive plant species control measures</u>

Buff-breasted sandpipers are not expected to be impacted by the current invasive plant management practices in the GND for two primary reasons. First, the marine and freshwater wetland areas where these birds occur are only very lightly treated, if at all, for invasive species. Secondly, they capture their prey items primary from bodies of water. These potential prey animals would not be directly exposed to herbicide application as currently applied to plants in the GND.

<u>Literature cited</u>

Audubon Society. 2002-052.

Audubon Society (Seattle Bird Web). 2002-178.

Sibley, D. et al. 2001.

6.4.6 Fowl-Like Birds

Phasianidae - Pheasants, Quail

Two species of the Phasianidae are reported from the GND (Table 6.7). California quail, *Callipepla californica*, is a native species and has been the California State bird since 1931. The non-native ring-necked pheasant, *Phasianus colchicus*, is a domestic species, widely introduced from Eurasia (Alterfer 2006).

Quail are ubiquitous resident birds in the GND, reported by all dune researchers and frequently sighted by Audubon birders, as well as many visitors. They are reported from foredune, dune swale, coastal dune scrub, and riparian habitats. In the Oceano Dunes State Vehicle Recreation Area, California quail comprised about 2.4 percent of the 2,512 terrestrial birds observed in variable circular plot sampling (n=112) in 1989-90 (Kutilek et al. 1991).

Quail populations were managed at the Dunes Lakes properties as part of a hunting preserve for over 40 years (Smith et al. 1976). Feeding and management of quail started in the 1930s when the population approximated 200 birds. After extensive predator control programs in the late 30s, quail numbers increased dramatically to between 3,000 and 4,000 birds. Predator control has been discontinued in order to re-establish and maintain the Dune Lakes as a wildlife preserve.

Quail normally forage almost exclusively on seeds, green plant matter and lesser quantities of insects. Leopold (1977) lists lupine seeds as one of the quail's most nutritious food resources, but they also eat seeds of filaree (*Erodium* spp.), deerweed (*Lotus* spp.), and fiddleneck (*Amsinckia* spp.). Restoration efforts in the GND to increase lupine abundance, along with reductions in area covered by invasive plant species, are likely to favor larger quail populations.

<u>Literature cited</u>

Alterfer, J. Ed. 2006.

Leopold, A. 1977.

CONFIRMED FOWL-LIKE BIRDS		Relative Abundance			Seasonal Observations	Breeding Locale
Scientific Name	Common Name	Oso Flaco Lake	ODSVRA	GOF		
Phasianidae	**Pheasants, Quail**					
Callipepla californica	California quail	C	C	C (Res)	Sp Su F W	**GND**, British Columbia to Baja CA
Phasianus colchicus	Ring-necked pheasant	-	-	U (Res)		No wild birds in GND; from Eurasia

UNCONFIRMED FOWL-LIKE BIRDS

NONE

NOTES:

OSVRA	-- Oceano Dunes State Vehicular Recreation Area	Res	Resident	Sp	Spring
GOF	-- Guadalupe Oil Field	C	Common at some time	Su	Summer
GND	-- Breeding reported in Guadalupe-Nipomo Dunes	U	Uncommon, even when most abundant	F	Fall
-	-- Not observed; No data	R	Rare, even when most abundant	W	Winter
		M	Migrant		

Table 6.7 Confirmed and Unconfirmed Fowl-Like Birds

6.4.7 Raptors, Birds Of Prey

Raptors evoke an image of birds with a strongly hooked bill, sharp, curved talons, and plain black, brown, and gray colors. In support of this weaponry, most raptors have binocular, color vision with large eyes relative to their body size.

Findings

Birds of prey are carnivores or scavengers, and represent five separate families that include: vultures (Cathartidae; 1 GND species); kites, hawks, eagles, and osprey (Accipitridae; 12 GND species); falcons (Falconidae; 4 GND species); and owls (Tytonidae and Strigidae; 5 GND species). In total, 22 bird of prey species are confirmed to occur in the GND habitats (Appendix D; Table 6.8). An additional four predatory birds are suggested by a few authors to occur in the GND, but their occurrence remains unconfirmed at this time (Appendix D; Table 6.8).

Thirteen raptors are residents or occur as individuals during all seasons in GND habitats and four species are known to reproduce here (Table 6.8). Fifteen of the 22 raptors confirmed as present in the GND and designated as special-status species are shown in Table 6.1 and Appendix D.

In one-year studies, Dames and Moore (1979) and Kutilek et al. (1991), conducting timed observations around the GND and Oceano Dunes SVRA, report only 6 and 8 raptor species, respectively. At Oso Flaco Lake, Burton and Kutilek (1991) report 16 species (2 are owls) that represent over 180 observations and include 78 turkey vultures, 36 Northern harriers and 24 Osprey sightings. Smith et al. (1976) reports 24 species (4 are unconfirmed by us), but as mentioned previously, it is unknown whether this species list was the result of direct observation over several years or a compilation of what should be there based on habitat and range of species or anecdotal information. Recent long-term studies by Unocal (1999-2004) consultants report 18 bird of prey species.

CONFIRMED BIRDS OF PREY		Relative Abundance			Seasonal Observations				Breeding Locale
Scientific Name	Common Name	Oso Flaco Lake	ODSVRA	GOF					
Cathartidae	**American Vultures**								
Cathartes aura	Turkey vulture	C	R	C (Su, W)	Sp	Su	F	W	s. Canada to Cape Horn
Accipitridae	**Kites, Hawks, Eagles, Osprey**								
Accipiter cooperii	Cooper's hawk	U	Incidental	C (Res)	Sp	Su	F	W	s. Canada to n. Mexico
Accipiter striatus	Sharp-shinned hawk	U	R	C (W)		Su	F		Alaska, Canada to n Argentina
Aquilla chrysaetos	Golden eagle	-	-	R (Res)		Su		W	Mt. Regions of N. Hemisphere
Buteo jamaicensis	Red-tailed hawk	U	R	C (Res)	Sp	Su	F	W	**GND**, Alaska, Canada to Panama
Buteo lagopus	Rough-legged hawk	U	-	R (M)					Arctic, circumpolar
Buteo lineatus	Red-shouldered hawk	U	-	C (Res)	Sp	Su	F	W	se Canada, e US, CA, Mexico
Buteo regalis	Ferruginous hawk	Incidental	-	R (M)				W	sw Canada, w. US
Buteo swainsoni	Swainson's hawk	Incidental	-	R (M)	Sp	Su	F		nw. No. America to n. Mexico
Circus cyaneus	Northern harrier (Marsh hawk)	C	-	C (Res)	Sp	Su	F	W	**GND**, Alaska, Can. - s. US, Eurasia
Elanus leucurus	White-tailed kite	U	R	U (Res)	Sp	Su	F	W	**GND**, w. Oregon & s.Texas-Argentina
Pandion haliaetus	Osprey	C	-	R (W)		Su	F	W	Almost cosmopolitan
Falconidae	**Falcons**								
Falco columbarius	Merlin	R	Incidental	R (W)	Sp	Su	F	W	n. parts of N. Hemisphere
Falco mexicanus	Prairie falcon	-	-	R (Res)		Su			sw Canada, w. US to s. Mexico
Falco peregrinus anatum	Peregrine falcon	R	-	R (Res)	Sp	Su	F	W	Nearly worldwide
Flaco sparverius	American kestrel	U	-	C (Res)	Sp	Su	F	W	**GND**, Most of N.& S. America
Tytonidae	**Barn Owls**								
Tyto alba	Barn owl	Incidental	Incidental	C (Res)	Sp	Su	F	W	s. Canada to Tierra del Fuego
Strigidae	**Owls**								
Asio otus	Long-eared owl	-	-	U (M)	Sp	Su	F	W	Canada, US, Eurasia, n Africa
Asio flammeus	Short-eared owl	-	-	U (M)				W	Nearly worldwide
Athene cunicularia	Burrowing owl	-	-	U (Res)	Sp	Su	F	W	sw. Canada, w. US, Fla-Argentina
Bubo virginianus	Great-horned owl	U	R	C (Res)	Sp	Su	F	W	Tree limit No. Am. to Tierra del Fuego

UNCONFIRMED BIRDS OF PREY		Relative Abundance			Seasonal Observations				Breeding Locale
Scientific Name	Common Name	Oso Flaco Lake	ODSVRA	GOF					
Accipitridae	**Kites, Hawks, Eagles, Osprey**								
Accipiter gentilis	Goshawk	-	-	-	-	-	-	-	Eurasia, n. North America
Haliaeetus leucocephalus leucocephalus	Bald eagle	-	-	R				W	Alaska, Canada to s. US
Strigidae	**Owls**								
Aegolius acadicus	N. Saw-whet owl	-	-	-	-	-	-	-	se. Alaska, Can, US to s Mexico
Otus asio	Eastern screech owl	-	-	-	-	-	-	-	s. Canada to cen. Mexico
Otus kennicottii	Western screech owl	-	-	-	-	-	-	-	se. Alaska to cen. Mexico

NOTES:

OSVRA -- Oceano Dunes State Vehicular Recreation Area
GOF -- Guadalupe Oil Field
GND -- Breeding reported in Guadalupe-Nipomo Dunes
- -- Not observed; No data

Res Resident
C Common at some time
U Uncommon, even when most abundant
R Rare, even when most abundant
M Migrant

Sp Spring
Su Summer
F Fall
W Winter

Table 6.8 Confirmed and Unconfirmed Birds of Prey

Habitat relationships

Raptors are commonly sighted while flying over most, if not all, of the GND habitats. Habitat use by raptors is diverse in the GND and with no direct link of any one species to any one habitat reported (Appendix D). There are, of course, some fairly close habitat relationships such as for osprey, which take fish prey in the various dune wetland habitats, and several of the accipiter hawks that hunt in thick tree cover. Raptors associated with coastal dune scrub represent the more diverse assemblage, but, except for burrowing owls, probably do not roost or nest in coastal dune scrub.

Typically, raptors forage in more open habitats, such as perennial or annual grassland communities, that support a wide assortment of potential prey items such as insects, amphibians, reptiles, birds, and small mammals such as deer mice, California ground squirrel, California vole and kangaroo rats.

Tall trees, along with tall, man-made structures, are important habitat components for many raptors. Oak and eucalyptus trees offer elevated locations for nesting birds such as red-tailed hawk, white-tailed kite, and American kestrel. Roosting and prey sighting activities for Northern harrier, turkey vultures, barn owls, great-horned owls, long-eared owls, red-tailed, rough-legged, red-shouldered, cooper's, sharp-shinned, ferruginous, and Swainsons hawks along with white-tailed kite, Merlin falcon and golden eagle are associated with Eucalyptus trees in the GND. These species have acclimated to and benefit from the modified habitat provided by this non-native species.

Potential effects of invasive plant species control methods

Well-known concern about this group of apex predators is the damage to them from bioaccumulation of toxic organochloride pesticides, such as DDT, and the resultant negative impacts to their reproduction. The federal Endangered Species Act was instigated in large part on the plight of the bald eagle and their connection with DDT. The effects of residual, or legacy, harmful chemicals such as DDT, some of which may be present in the GND (Dugan 2005), on raptors, or any other animal taxa, are out of the scope of this report.

There are many successful recoveries of raptors following the discontinued use of these pesticides in the US and other countries in the 1970's, but raptors continue to face dangerous challenges. For example, Swainsons hawks, migrating annually from breeding areas in the US midwest to as far south as Argentina, have been impacted by persistent pesticides in countries where their controls are less stringent or not enforced as they are generally in the US (Alderfer 2006). Lead also impacts raptors as a result of being shot by led pellets or consuming lead pellets from prey shot by lead pellets in the US or other countries. As explained earlier, birds are generally not directly impacted by the herbicides in current use in the GND because they biodegrade in a short amount of time, do not bioaccumulate, and act on a plant enzyme system not present in vertebrates. Secondary effects might be from a change in the vegetation and concomitant change in the associated fauna, that may include potential prey species for the raptors, brought about by the herbicide applications. However, in the GND, the expected change in the vegetation in treated areas will be reversion to native species that, in the long term, will be a benefit to raptors as well as all native bird and animal species.

Brief accounts of raptor families in the GND

Fifteen of the 22 raptor species known to occur in the GND are special-status species and are described in detail in following sections. Due to a general interest in raptors, pertinent aspects of the biology relative to the GND of the remaining 7 species of common raptors are briefly described below.

Cathartidae – Vultures

Of the three North America vultures, only the turkey vulture is reported from the GND where they are commonly observed. Much of their diurnal activity is soaring, searching for food. A vulture's diet consists mostly of carrion, which they spot from the air by sight and smell. At night they usually roost in tall trees, with eucalyptus trees frequently providing roost sites for turkey vultures in our area. Vultures usually don't build a nest and will lay eggs on the ground, in caves, hollow stumps, or in swamps. These raptors can be sensitive to environmental pollutants mainly accumulated toxins such as lead and pesticides from carrion.

Accipitridae – osprey, kites, eagles and hawks

Nine of the 12 GND species of accipitrids are special-status species. Birds in this family may be resident species or may undertake long migration journeys, traveling thousands of miles each year. Their diet consists primarily of small mammals, but as a group they will capture a wide variety of prey.

Five Buteo hawks, stout bodied, soaring hawks with broad wings and fan shaped tails, are confirmed to occur in the GND. The three common species are the year-round resident red-tailed hawk, *B. jamaicensis*, and red-shouldered hawk, *B. lineatus*; rough-legged hawk, *B. lagopus*, are common in the GND but not resident.

The most common and widespread hawk in North America, the red-tailed hawk is a bird of open habitats (Lehman 1994). In the GND, red-tails have been observed in habitats running inland from the foredunes to the oak woodlands (except riverine). Although, they are breeding residents in the GND and present year round, there maybe a substantial replacement of individuals on a seasonal basis (Lehman 1994). They feed on a wide variety of prey but mammals and reptiles commonly make up a large part of their diet, and include everything from small mice to rabbits, fish, medium-sized birds, and reptiles such as lizards and snakes (University of Minnesota 2002).

A common forest-dwelling hawk of California, red-shouldered hawks frequent oak and riparian woodland (Lehman 1994). Like the red-tailed hawk, this hawk will feed on a variety of prey, primarily small rodents, amphibians, and reptiles. Red-shouldered hawks are observed commonly during all seasons, but are not reported to breed in the dunes. Breeding birds typically prefer well-wooded areas along water courses (Marantz 1986). Populations appear stable, but may be declining in some areas (Cornell Lab of Ornithology 2004). A separate population is found along the Pacific coast.

Less is known about rough-legged hawk, but they frequent open country like the agricultural areas of the Cuyama Valley in Santa Barbara County (Lehman 1994). A northern bird, they breed in Arctic tundra and taiga regions around the northern hemisphere. *B. regalis* is a rare winter visitor along the SLO County coast (Marantz 1986) and reported only in winter in the GND (Smith et al. 1976; Burton and Kutilek 1991).

Falconidae - falcons

Falcons, among all the birds, are the most aerial and acrobatic of the raptors, their flight ability is legendary. Powerful fliers and divers, they can fly at speeds of over 100 miles per hour. These raptors typically live in open country and do not build their own nests, but scrape out spots on cliffs or in cavities.

Among the four falcon species found in the GND (American kestrel; merlin; prairie falcon; and peregrine falcon), American kestrels, *Falco sparverius*, formerly known as sparrow hawks, are fairly common, resident species that breed in the GND (Table 6.8). They occur in most dune habitats except beach, active sand, and riverine areas. Prey is generally small vertebrates but kestrels may concentrate on grasshoppers and other large invertebrates when abundant (Farrand 1983).

Controlled burns could reduce the numbers of grasshoppers or other prey species potentially available to, especially, kestrels but also potentially other GND raptors. Similarly, kestrels may ingest grasshoppers or other invertebrates inadvertently sprayed with herbicide. In the first instance, the area affected by controlled burns is almost insignificant when compared to the rest of the habitat unaffected by burns in the GND. In the second instance, the number of insects sprayed and then eaten by kestrels would probably be fairly small and in any case, the herbicides used in the GND are not expected to have a detrimental effect on birds as the enzyme pathway affected by the herbicide to kill plants does not exist in vertebrates.

Tytonidae and Strigidae - Owls

Five owl species occur in the GND. “Typical” owls (family Strigidae) include burrowing owls, long-eared owls, short-eared owls, and great-horned owls; barn owls are in the family Tytonidae. The first three species are special-status species. Barn owls, burrowing owls, and great-horned owls are resident in the GND while long-eared and short-eared owls are migratory. No owl species are recorded as breeding in the GND (Table 6.8).

Great-horned owls are the most widespread owls in north America. They feed almost entirely at night in open areas from a perch, swooping down on prey, primarily mammals up to the size of rabbits (Alderfer 2006). Their population in the US is robust and stable (Alderfer 2006). Barn owls inhabit every continent except Antarctica (Alderfer 2006). In some Midwestern and eastern states, barn owls are considered endangered (Sibley et al. 2001) but not in California. They hunt small mammals and other vertebrates on the wing or while hovering in habitats from grasslands to closed forests (Alderfer 2006).

<u>Literature cited</u>

Alderfer, J. 2006.

Cornell Lab of Ornithology 2004.

Dugan, J. 2005.

Farrand, J. 1983.

Lehman, P.E. 1994.

Marantz, C. 1986.

Sibley et al. 2001

University of Minnesota. 2002.

Raptor special-status species accounts

Species accounts are given for 15 special-status raptor species (Table 6.1; Appendix D). Of these species, five are Category 1 (most sensitive) and ten are Category 2 (sensitive). No raptors are Category 3 (of some concern).

Osprey ***Pandion haliaetus***

Status

Osprey are a Category 2 special-status species (sensitive).

Formerly a breeding bird throughout much of California, Osprey have vanished as a nesting species almost completely from southern California, including the Channel Islands. Removal of nesting trees, degradation of river and lake environmental quality, boating on nesting lakes, and shooting may be in part responsible for the decline since Southern California populations had disappeared long before the pesticide era. In northern California, there still are healthy populations just inland from the coast from Sonoma Co. north and in Shasta, Lassen, and Plumas counties (Remsen 1978).

Recommendations to conserve the species by California Department of Fish and Game include: (1) Maintain restrictions on use of persistent pesticides in the United States. (2) Protect nesting trees, many of which are dead and thus susceptible to tree removal operations. (3) Where needed, restrict boating during breeding season on lakes fished by Osprey. (4) Provide man-made nesting sites to attempt to restore osprey populations in the southern portion of the range.

Habitat and occurrence within GND

In the GND, osprey has been observed over many dune habitats, primarily estuarine and wetlands, but also coastal dune scrub, riverine, and riparian habitats (Table 6.8). They are migratory and pass thru the GND from late summer into winter.

Habitat in other areas

Osprey are associated with open water habitats, either fresh or salt water, where they can forage for fish. The species uses large trees, snags, and dead-topped trees in open forest habitats for cover and nesting. Nests are usually close to fish-producing water. They need tall, open-branched "pilot trees" nearby for landing before approaching the nest, and for use by young for flight practice (Polite 1983).

Present status within GND.

Osprey are reported as rare winter visitors to the GOF but as common sightings at Oso Flaco Lake (Table 6.8). Given the 15 years between these two reports, osprey may have become less common in the GND habitats in the last decade or so. However, they continue to be reported regularly in various GND habitats (MCAS 2004, 2005).

Life history

Osprey, one of the largest birds of prey in North America, are also one of the most widespread birds in the world, found on all continents except Antarctica.

Nests are constructed on platforms of sticks on cliffs, at the top of large snags, and dead-topped trees as much as 250 ft. above ground. Occasionally, it builds nests on the ground. The osprey readily builds its nest on manmade structures, such as telephone poles, channel markers, duck blinds, and nest platforms designed especially for it. These platforms have become an important tool in reestablishing ospreys in areas where they had disappeared. The osprey is a fish-eating specialist, with live fish accounting for about 99% of its diet.

Potential effects of invasive plant species control methods

Ospreys consume fish. Although herbicide application is carefully monitored around water bodies, osprey may be subject to contamination due to “upstream” application of pesticides in nearby agricultural fields. In addition, elevated pesticide concentrations measured at the mouth of the Santa Maria River could burden the vulnerable osprey with more toxins (Dugan 2005).

Literature cited

Dugan, J. 2005.

Polite, C. 1983.

Remsen, J.V. Jr. 1978a.

White-tailed kite *Elanus leucurus*

Status

White-tailed kites are a Category 1 special-status species

At the turn of this century, the white-tailed kite may have been widespread throughout the lowlands of California, but during the early 1900’s, the population severely declined. During the 1930’s, extinction was predicted for this species in California. Causes of this decline were likely habitat loss, shooting, and possible egg collecting. From the 1940’s to the 1970’s, populations and distribution increased due to protection from shooting and an increase in agricultural development, which may have increased rodent habitat (Dunk 1995; Partners in Flight 2000b).

Today, California contains the largest number of white-tailed kites in North America. However, while populations of white tail kites have been decreasing in some areas since the 1980’s, including the Central valley and southern California grasslands, overall numbers in California have continued to increase. Possible declines may be due to conversion of agricultural lands to urban areas and clean farming techniques that reduce prey populations, increased interspecific nest-site competition, and human disturbance at nests (Dunk 1995; Partners in Flight 2000b).

Habitat and occurrence within GND

In the GND, white-tailed kite are recorded from dune swale, coastal dune scrub, riverine, wetlands, riparian, oak woodland, eucalyptus forest habitats and agriculture field habitats (Appendix D). They are observed year round in the GND and are known to breed in the area (Table 6.7).

Habitat in other areas

White-tailed kites are found in virtually all lowlands of California west of the Sierra Nevada range and the southeast deserts. They are common in the Central Valley and along the entire California coast (Partners in Flight 2000b). Freshwater and coastal salt marshes are their preferred habitats. These kites, however, are frequently observed hovering above grassland and scrub habitats, as well as in the highly managed landscapes of agricultural fields and pastureland. They are fairly commonly observed hovering over grassy median strips of freeways in Central California.

Present status within GND.

Observation of white-tailed kites is uncommon but consistent over all seasons of the year over the past 25+ years. Their consistent occurrence is bolstered by observed breeding in the dunes (Dames & Moore 1979).

Life history

White-tailed kites breed in lowland grasslands, agriculture, wetlands, oak-woodland and savannah habitats, and riparian areas associated with open areas (Partners in Flight 2000b). Kites do not seem to associate with particular plant communities, but are more tied to prey abundance and vegetation structure. During the non-breeding season, the white-tailed kite roosts communally, with more than 100 individuals counted at some roosts.

Although some populations fluctuate regularly in size, it is unknown whether the white-tailed kite is migratory, nomadic, or both (Ball 2004).

Year-round diet consists of >95% small mammals, which, in California, include voles (*Microtus* spp.), mice (*Mus* spp.), and harvest mouse (*Reithrodontomys* spp.) (Partners in Flight 2000b).

Potential effects of invasive plant species control methods

The potential effects of pesticide use on kites, either directly (e.g. reduced egg viability) or indirectly (e.g., reduced prey populations) have not been studied (Partners in Flight 2000b). Land use practices that remove nest trees may be detrimental to kite reproduction (Ball 2004).

White-tailed kites forage on small rodents that in turn forage on plants and seeds, and insects. Spraying of herbicides could indirectly affect prey availability for kites and other birds of prey by reducing the forage for small rodents. However, the effects of herbicides on white-tailed kites in the GND are likely to be negligible because: 1) the application method is target-plant specific; 2) the area affected by invasive weeds and therefore potentially subject to herbicide application is small (ca. 10%) compared to the total area of relatively pristine dune habitat; and 3) the herbicides used in the GND do not demonstrate a significant detrimental effect on vertebrates that may ingest treated material.

Other common names

From 1981 to 1994, American Ornithologists' Union (AOU) considered the white-tailed kite to be a subspecies of the black-shouldered kite *(E. caerulus*)

Subspecies

One subspecies in North America, *E. l. majusculus*.

Literature cited

Ball, M. 2004.

California Partners in Flight. 2000b.

Dunk, J.R. 1995.

Bald eagle ***Haliaeetus leucocephalus leucocephalus***

Status

Bald eagles are a Category 1 special-status species (very sensitive). Our national emblem, the numbers of bald eagles in the United States was severely reduced by pesticide use in the US and elsewhere prior to the ban of the significantly detrimental (to top predators) pesticide DDT in 1972. Following this ban, and in conjunction with other conservation measures, the bald eagle may soon be removed from the federal Endangered Species List (USFWS 2006).

Habitat and occurrence within the GND

Bald eagles are rarely observed in the GND. One confirmed sighting was a single bird passing over the Pismo State Beach Oceano Campground in September 2004 (MCAS 2004). Bald eagles are regularly observed in San Luis Obispo County at Lopez Lake, approximately 10 miles, or less, direct line distance from the GND (MCAS 2004).

Habitat in other areas

Bald eagles are found in a wide variety of habitats but are typically observed close to water along seashores, rivers, and large lakes (Kaufman 1996). During migrations, are found in open country and mountains. In other parts of the country, bald eagles are found in swamps, edges of conifer forests, treeless islands, desert rivers, and dry western valleys (Kaufman 1996).

Present status within the GND

Unknown, but presumably a rare visitor or vagrant in GND habitats. Not recorded from dune lake or GND estuarine habitats.

Life history

Bald eagles range from the northern most areas of North America to northern Mexico (USFWS 2006). They generally nest in the northern areas and migrate to the southern areas in winter but in some areas (Northern California, parts of Idaho and Montana) they are year round residents (Kaufman 1996). They winter in various habitats but generally prefer tall, mature trees near water bodies with abundant fish (USFWS 2006).

Bald eagles feed heavily on fish in most areas and are known to feed on herring, salmon, carp, and catfish. When fish are scarce, they will take other birds (ducks, coots, auklets) or mammals such as jackrabbits and muskrats (Kaufman 1996). They are known to eat carrion extensively when available and other more preferred prey are not abundant (USFWS 2006). Other prey items include snakes, turtles, crabs and shellfish in addition to domestic livestock such as lambs, calves and chickens (Kaufman 1996; USFWS 2006).

Known as opportunistic feeders, balk eagles take prey as either a predator or a scavenger (Kaufman 1996; USFWS 2006). As a predator, the eagle takes prey by swooping down and grabbing it in its talons; as a scavenger, they approach the food items on the ground (Kaufman 1996). Carrion items are generally fish but may also be other dead animals.

Potential effects of invasive plant species control methods

Unknown. Balk eagles are not likely to encounter any animals that came into contact with herbicides used to control weeds in the GND. Their preferred carrion is generally dead fish and open water areas are not currently treated with herbicides that may kill fish in the GND.

Literature cited

Alderfer, J. 2006.

Kaufman, K. 1996.

MCAS 2004. (Morro Coast Audubon Society).

USFWS 2006. (United States Fish and Wildlife Service).
[www.fws.gov/migratorybirds/baldeagle.htm; accessed Dec. 2006).

Northern harrier (marsh hawk) ***Circus cyaneus***

Status

Northern harrier are a Category 2 special-status species (sensitive).

The loss and degradation of marshlands, plus past use of the pesticide DDT, have severely reduced the numbers of the northern harrier. As a resident species in California, northern harrier numbers steadily decreased from the early 1950's until about 1965, followed by a very slight increase through 1969 although their numbers are still below 1953 levels (Remsen 1978). Populations are larger in winter (Remsen 1978). They greatly declined in California as a breeding bird due to the destruction of marsh habitats and grazing in grasslands where they nest. Currently, the bulk of the breeding population is concentrated in ungrazed portions of state and in federal wildlife refuges (California Partners in Flight 2000a).

Among others recommendations for northern harrier protection made by the California Department of Fish and Game is to protect marsh habitat as well as suitable grasslands; grazing in and around marsh borders should be eliminated in late winter and spring to protect the nest sites of this ground nester.

Habitat and occurrence within GND

In the GND, Northern harrier has been observed over many dune habitats including: beach-dune strand, estuarine, foredune, dune swale, coastal dune scrub, riverine, and wetlands (Table 6.8). It is considered a resident species, present year round, and has been observed to breed in the GND (Table 6.8). Breeding areas within the GND, and elsewhere, are on the ground in tall reeds or grass or under small shrubs (Sibley 2001).

Habitat in other areas

As discussed, northern harriers are frequently associated with wetland habitats for foraging and grasslands when breeding. They are ground nesters that require 75 days to fledge young; nesting sites free from predation with high rodent numbers are very important habitat components.

Present status within GND.

The northern harrier was observed to be consistently present, a common resident in GND habitats (Dames & Moore 1979). They continue to be observed regularly by MCAS members and other amateur birders.

Life history

The species is often called the marsh hawk because it inhabits open marshlands and wet meadows. Its' name "harrier" due to its habit of harrying its prey.

Similar to other raptors, northern harrier presence is strongly correlated with prey availability. They have a remarkable sense of hearing which, when combined with characteristic low flight, enables the bird to locate prey by sound (Bent 2005a). Northern harriers predominantly feed on small mammal, mainly, *Microtus* species. However, harriers are also generalists, and their diet may include reptiles, amphibians, birds, and invertebrates (Partners in Flight 2000a).

The northern harrier occurs throughout the United States, Canada and north to Alaska. They are also found in Europe and Asia. The species winters over parts of its nesting range, but more common south through Mexico, Central America, northwestern South America and the West Indies.

Potential effects of invasive plant species control methods

Northern harriers focus foraging efforts around wetland and marsh habitats and restoration activities are most carefully practiced around these sensitive areas. Northern harriers may therefore be less susceptible to any potential risk from invasive plant species control methods than other raptors.

Literature cited

Bent, A.C. 2005a.

California Partners in Flight. 2000a.

Remsen, J.V. Jr. 1978a

Sibley et al. 2001.

Cooper's hawk *Accipiter cooperi*

Status

Cooper’s hawk is a Category 2 special-status species (sensitive) due to loss of nesting habitat.

Once considered a common nester throughout California, Cooper's hawk has declined as a breeding bird over the last two or three decades (Remsen 1978). Much greater numbers winter in California. Lehman (1994) noted the species previously nested throughout much of coastal Santa Barbara County, but has become a rare breeder. In San Luis Obispo County, Marantz (1986) reported *A. cooperi* to be an uncommon transient, winter visitor with greatest numbers along the immediate coast in fall.

Habitat destruction, mainly in lowland riparian areas, is probably the main threat, although direct or indirect human disturbance at nest sites can be equally detrimental.

Illegal take of nestlings is also a potential threat, especially in populated areas. Their rapid decline in the eastern United States was probably due to pesticides (Henny and Wight 1972; Snyder et al. 1973; Snyder and Snyder 1974), especially DDT (Risebrough et al. 1968) and it is likely that California populations were also affected to some extent (Remsen 1978).

Among other actions to protect the species, California Department of Fish and Game recommendations protection of riparian areas, limiting the take of nestlings for falconry, and a ban on use of persistent pesticides (Remsen 1978).

Habitat and occurrence within GND

Cooper's hawk is a resident species in the GND, present year round at least in some areas (Table 6.8), although it is not reported to breed in the GND. Typically, Cooper's hawk is observed flying over the foredune, dune swale, coastal dune scrub, and wetlands. They are also observations in riparian, oak woodland and eucalyptus forests where roosting, possible nesting and prey capture occur.

Habitat in other areas

Cooper's hawks are found in deciduous woodlands, occasionally coniferous forests. In some southern California urban areas, Cooper's hawks have become residents, breeding in large and smaller parks, school grounds, and housing developments (www.sdnhm.org).

Present status within GND

All surveys, including a limited survey in Black Lake Canyon (McClelland Engineers 1988), report Cooper's hawk in the GND (Table 6.8). In addition, members of the Morro Bay Audubon Society regularly report their occurrence at Oso Flaco Lake and Oceano in 2004.

Life history

A medium-sized predator, the Cooper's hawk is built for fast, agile flight through forest vegetation to catch and eat birds. Their prey are primarily birds ranging in size from nestling songbirds to crows and woodpeckers; which it pursues and catches on the wing. Small mammals such as squirrels and chipmunks, and occasionally fish, are also taken.

Cooper's hawk nests in tall, mature trees in the early spring. The nests are usually well off the ground and well hidden; nesting birds are not often observed. Clutch size is up to six eggs. The adaptations of Cooper's hawk to urban landscapes prompted the San Diego Natural History Museum to declare that eucalyptus trees have become as common a nesting site as coastal live oak for Cooper's hawk and that, due to their common presence in residential settings, "clearly any intent of the multiple-species conservation plan to address Cooper's hawks is now misguided" (sdnhm.org/research/birdatlas).

Potential effects of invasive plant species control methods

Cooper's hawks feed on smaller birds. In the GND prey species are most likely passerine and non-passerine birds associated with trees in riparian, oak woodland and eucalyptus forests. Burdens of toxic materials have been found in some *A. cooperi*, but no conclusive data are available to link accumulation of pesticides and prey for this species. The potential for accumulating toxic levels of DDT, its derivatives or other pesticides is possible, however. Observation of these hawks in the foredunes and dune swale suggest that they may be hunting for shorebirds. These shorebirds may be feeding on contaminated sand crabs, such as those near the mouth of the Santa Maria River (Dugan 2005).

Other common names

Cooper's hawk is also known as the chicken hawk because they prey on chickens.

Literature cited

Brown, W. H. 1973.

Dugan, J. 2005.

Henny, C.J., and H.M. Wight. 1972.

McClelland Engineers, Inc. 1988.

Remsen, J. V., Jr. 1978a.

Risebrough, R. et al. 1968.

Snyder, N. et al. 1973.

Snyder, H. A. and N. F. R. Snyder. 1974.

sdnhm.org/research/birdatlas. Accessed Nov 2004.

Sharp-shinned hawk ***Accipiter striatus***

Status

Sharp-shinned hawk are a Category 2 special-status species (sensitive) due to concerns regarding their nesting habitat.

The sharp-shinned hawk is listed as a species of concern in several states. Their numbers declined as a result of DDT but rebounded after DDT was banned in 1972. This species formerly bred in small numbers throughout much of northern California and in very small numbers in all the mountain ranges of southern California (Grinnell and Miller 1944 cited in Remsen 1978). The current breeding population appears greatly reduced from former levels, but data are lacking. Only a few breeders are reported during the summer months, and almost all of these are from northern California. Much greater numbers winter in California (Remsen 1978).

Recommendations from California Department of Fish and Game (Remsen 1978): 1) Survey present breeding status and research historical status. 2) Determine if populations have actually ever been much larger than at present and reassess placement in list categories accordingly.

<u>Habitat and occurrence within GND</u>

In the GND, sharp-shinned hawks were reported by Smith et al. (1976), Burton and Kutilek (1991), Kutilek et al. (1991) and Entrix, Inc. (1996) in dune swale, coastal dune scrub, wetlands, riverine, oak woodland, and eucalyptus forest habitats. From the records available, sharp-shinned hawks have been observed as migrants in the summer and fall.

<u>Habitat in other areas</u>

Sharp-shinned hawks are found in dense woodlands, montane forests, riparian zones along canyon bottoms and mountain streams and occasionally in coniferous forests. They may be becoming more common in some urban areas of California (Alderfer 2006).

<u>Present status within GND</u>

Several surveys report sharp-shinned hawks in the GND (Table 6.8). Despite a listing as a common winter visitor (Dames & Moore 1979), sharp-shinned hawks have been generally reported in summer and fall, but have been observed into December.

<u>Life history</u>

Sharp-shinned hawks, the smallest accipiter in North America, are mainly stealth hunters, employing a perch and wait or the element of surprise to flush their quarry. Prey consist of small birds; occasionally mice, shrews, bats, frogs and insects. Besides taking birds in trees and brush, these hawks are observed hunt around bird feeders. Fewer hawks may be migrating south, remaining further north near the ever more common backyard bird feeders, learning that they are a dependable source for food.

Nesting in April and May, eggs are incubated by both parent birds for 5 weeks. The young fledge after 23 days and the adults train them to catch prey by passing food to the young in mid-air.

Potential effects of invasive plant species control methods

Current invasive weed control methods in the GND can be expected to have little, if any, effect on sharp-shinned hawks for reasons stated in previous hawk species accounts. However, like Cooper's hawks, sharp shinned hawks feed on smaller birds, many of which may migrate long distances to countries where pesticides are not well regulated and return to the Central Coast with doses of DDT from feeding on contaminated prey. Raptors like sharp shins can concentrate legacy toxins from the prey caught in the GND.

Other common names:

Bird hawk, bullet hawk, little blue darter, pigeon hawk.

Literature cited

Grinnell, J. and A. H. Miller. 1944.

Remsen, J. V., Jr. 1978a.

Additional information sources

Connecticut Department of Environmental Protection. 1997.

Cornell Lab of Ornithology. 2003a.

Ferruginous hawk *Buteo regalis*

Named for its rust-colored feathers, the ferruginous hawk is the largest of the North American buteos.

Status

Ferruginous hawks are a Category 2 special-status species.

A 1991 a petition to add the ferruginous hawk to the list of species protected under the Endangered Species Act was rejected by the U.S. Fish and Wildlife Service.

Primary threats to ferruginous hawks are loss of habitat from agriculture and reduction in the number of available prey species from habitat loss and deliberate eradication programs. For example, the black-tailed prairie-dog, an important food source for ferruginous hawks, was the target of organized extermination campaigns by ranchers because they were perceived as competing for grass with cattle (Audubon Society 2002-081; Cornell Lab of Ornithology 2004). Conservation of grassland and shrub ecosystems in the western US has been organized under the Short-grass Prairie Bird Conservation Region initiative that includes this species and its habitats as a major priority in the development of conservation projects (Audubon Society 2002-081).

Habitat and Occurrence within GND

In the GND, ferruginous hawks were reported by Smith et al (1976), Entrix, Inc. (1996), Burton and Kutilek (1991) in estuarine, foredune, coastal dune scrub, wetlands, oak woodland, and Eucalyptus forest habitats. From the records available, they are an uncommon migrant, with only a few reported in winter (e.g. January 2001 at the Santa Maria River Mouth).

Habitat in other areas

Ferruginous hawks are found in the open plains, short-grass prairie, and desert uplands (Audubon Society 2002-081). They frequent open country, primarily prairies, plain and badlands, breeding in trees near streams or on steep slopes, sometimes on mounds in open desert (Cornell Lab of Ornithology 2004).

Present status within GND

Observation of ferruginous hawks in the GND is a rare occurrence. Reported only by Smith et al (1976), Entrix, Inc. (1996), Burton and Kutilek (1991) indicates a continuing, but inconsistent presence in the dunes for over two decades. Like golden eagles (or any other rare bird), efforts to observe ferruginous hawks require a long term, consistent monitoring program.

Life history

These large, uncommon raptors hunt for small mammals in open terrain. Prairie-dogs, ground squirrels, rabbits and hares are its primary prey but they also take snakes, insects and occasionally birds (Audubon Society 2002-081; Alderfer 2006). Although they use trees for perches, ferruginous hawks often hunt from ground perches and pounce on prey as they move through the soil or when they surface from burrows.

Nesting sites can be found on cliffs, outcroppings or single trees, though in areas where such sites are not available this species may nest on the ground (Audubon Society 2002-081

Potential effects of invasive plant species control methods

See similar topic discussion for Golden Eagles.

Literature cited

Alderfer, J. 2006.

Audubon Society. 2002-081.

Cornell Lab of Ornithology. 2004.

Swainson's hawk ***Buteo swainsoni***

Status

Swainson’s hawks are a Category 1 special-status species.

The loss of agricultural lands to various residential and commercial developments is a serious threat to Swainson's hawks throughout California due to the loss of prime foraging habitat. Additional threats are habitat loss due to riverbank protection projects, conversion from agricultural crops that provide abundant foraging opportunities to crops such as vineyards and orchards which provide fewer foraging opportunities, shooting, pesticide poisoning of prey animals, competition from other raptors, and human disturbance at nest sites (www.cdf.ca.gov/hcpb). Swainson's hawk migrates more than 6,100 mi. to its wintering grounds in South America. The use of persistent pesticides in Argentina was responsible for the deaths of nearly 6,000 Swainson's Hawks in 1995 and 1996 (Cornell Lab of Ornithology 2004).

Circa 1900, populations in excess of 17,000 pairs of Swainson’s hawks were found throughout lowland California. Swainson's hawks are currently restricted to portions of the Central Valley and Great Basin regions where suitable nesting and foraging habitat is still available. Based on a study conducted in 1994, the statewide population is estimated to be approximately 800 pairs (CDF&G–HCPB 2003; Cornell Lab of Ornithology 2003c).

Habitat and occurrence within GND

In the GND, Swainson’s hawks were reported by Smith et al. (1976), Unocal (1999-2004), Burton and Kutilek (1991) in foredune, dune swale, coastal dune scrub, oak woodland, and Eucalyptus forest habitats (Table 6.8). Available records indicate that Swainson’s hawks are uncommon, with only a few reported in the spring, summer and fall (e.g. October 1984 in Oceano).

Habitat in other areas

Swainson’s hawks frequent open grasslands and agricultural areas (Alderfer 2006).

Present status within GND

Observation of Swainson’s hawks in the GND is a rare occurrence. Swainson’s, however, continue to be observed in the GND though not on a regular basis (Smith et al. 1976; Burton and Kutilek 1991; Unocal 1999-2004; Morro Coast Audubon Society, Tom Edell, pers. comm.) and indicate a continuing, but inconsistent presence in the dunes over a 25+-year period. Similar to other transient raptors, to observe Swainson’s hawks requires consistent, long term monitoring.

Life history

Swainson's hawk has one of the longest migrations of any American raptor - from Canada to as far south as Argentina (Cornell Lab of Ornithology 2004; Sibley, et al. 2001). Only tundra breeding peregrine falcons travel farther.

The diet of the Swainson's hawk is varied, with the California vole being the staple in the Central Valley. A variety of bird and insect species are also taken. During the breeding season, they feed mostly on rodents such as ground squirrels, gophers, field mice, etc., and to a lesser extent on grasshoppers, locusts, and other insect swarms, which they capture in open fields. While wintering in Argentina, they feed primarily on grasshoppers and locusts, often feeding along storm fronts carrying large quantities of these invertebrates (California Department of Pesticide Regulation, Endangered Species Project 2005).

Over 85 percent of Swainson's hawk territories in the Central Valley are in riparian systems adjacent to suitable foraging habitats. Suitable foraging areas include native grasslands or lightly grazed pastures of alfalfa or other hay crops, and certain grain and row croplands. Areas unsuitable for foraging Swainson's hawks include agricultural lands with crops such as vineyards, orchards, corn and certain other row crops along with fields of rice and cotton.

Swainson's hawks often nest peripherally to riparian systems of the valley as well as utilizing lone trees or groves of trees in agricultural fields. Valley oak, Fremont cottonwood, walnut, and large willow with an average height of about 58 feet are the most commonly used nest trees in the Central Valley. They require large, open grasslands with abundant prey in association with suitable nest trees (CDF&G–HCPB 2003; Cornell Lab of Ornithology 2003c).

Potential effects of invasive plant species control methods

Generally similar to that presented for golden eagles.

Literature cited

Alderfer, J. 2006.

Audubon Society. 2002-199.

CDF&G–HCPB. 2003.

California Department of Pesticide Regulation, Endangered Species Project. 2005.

Connecticut Department of Environmental Protection. 2005.

Cornell Lab of Ornithology. 2003c.

Golden eagle ***Aquilla chrysaetos***

Status

Golden eagles are a Category 1 special-status species.

The California Department of Fish and Game listed the golden eagle as a California Species of Special Concern on March 4, 1982. Golden eagles were once a common permanent resident throughout the open areas of California; numbers are now reduced near human population centers, but in general, populations seem stable (Remsen 1978). However, this species' natural densities are very low and its reproductive rate is very low. Only 500 pairs are estimated to nest in California (Thelander 1974).

Habitat destruction (reclamation of grasslands for agriculture), shooting, and human disturbance at nest sites are major threats. Disturbance by humans during the breeding season was found to be the major source of nest failure in other western states (Snow 1973). Pesticides do not seem to be an immediate threat (Reichel et al. 1969). Although population numbers of golden eagle have been reduced near urban development, in general, the Department of Fish and Game considers the populations to be relatively stable (Remsen 1978a) although they are though to be slowly declining in western states by others (e.g., Alderfer 2006).

Habitat and occurrence within GND

Golden eagles were reported by Smith et al. (1976), and Unocal (1999-2004) in beach-dune strand, coastal dune scrub, wetlands, oak woodland, and eucalyptus forest habitats. From the records available, golden eagles are uncommon, with only a few observed in spring, summer, and winter.

Habitat in other areas

Golden eagles have been observed using a variety of habitat types, including rolling foothills, mountain areas, sage-juniper flats, cliffs and rock outcrops, desert habitats, and wide arid plateaus deeply cut by streams and canyons (Polite and Pratt 1990). They prefer open terrain for hunting, such as grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats (Polite and Pratt 1990). Golden eagles usually nest in rugged, open habitats with canyons and escarpments (Polite and Pratt 1990). Nests are typically on cliffs and rock outcroppings; however, eagles will also nest in large trees including oaks, sycamores, redwoods, pines, and eucalyptus (Polite and Pratt 1990). They will also nest on artificial structures such as transmission line towers.

Present status within GND

Observation of golden eagles in the GND is an uncommon occurrence. Reported only by Smith et al. (1976) and Unocal (1999-2004) indicates a continuing, but inconsistent presence in the dunes over a 25+ year period.

Life history

Within California, the eagle is a year round resident generally inhabiting mountainous and hilly terrain (Ivory and Kirschbaum 2002).

Golden eagles are climax predators feeding on small carnivores (Ivory and Kirschbaum 2002). This large and powerful bird can attack and kill many large mammals and birds. Some mammals present in the GND and reported as golden eagle prey includes large deer and fawns, domestic calves, lambs, dogs, cats, young pigs, foxes, hares, rabbits, ground and arboreal squirrels, raccoons, prairie dogs, opossums, skunks, weasels, pocket gophers, rats, mice, and moles (Ivory and Kirschbaum 2002). Bird prey includes great blue heron, turkeys, geese, ducks, red-tailed hawk and short-eared owl, quails, band-tailed pigeon, crow, curlews, plovers, kingfisher, meadowlarks, and thrushes. Birds, particularly the smaller species, are taken mainly during the nesting season for the young. Eagles kill many snakes and occasionally tortoise (Bent 2005).

They are also known to scavenge wounded or dead animals when live prey is scarce. High body burdens of lead in wounded animals can be ingested and thus accumulated in the eagle's tissues. In a similar mechanism, pesticides and herbicides in eagles' prey may concentrate in the birds tissues and lead to reproductive dysfunction or premature death.

Literature cited

Bent, A.C. 2005.

Ivory, A. and K. Kirschbaum. 2002.

Polite, C. and J. Pratt. 1990.

Reichel, W., et al. 1969.

Remsen, J.V. Jr. 1978a.

Snow, C. 1973.

Thelander, C.G. 1974.

Additional information sources

Connecticut Department of Environmental Protection. 2005.

Cornell Lab of Ornithology. 2003.

LSA Associates. 2004.

Olendorff, R. R., A.D. Miller, and R. N. Lehman. 1981.

Merlin ***Falco columbarius***

Status

Merlin are a Category 2 special-status species.

Similar to peregrine falcons, merlin populations were much reduced, by both direct mortality and reduced reproductive success, by organochloride pesticides, primarily DDT, until the chemicals were banned in 1972. Since that time, the numbers of the three subspecies of merlin have rebounded, but may not have reached their historical levels. The two subspecies (prairie and black) that breed and winter for the most part in North America appear to be unaffected by residual levels of this pesticide while the taiga merlin, which winters in South America, may continue to come into contact with DDT in those countries. Of the three subspecies, the prairie merlins appear to be increasing within cities, while the taiga and black subspecies are stable (Alderfer 2006). Merlin occur as transients throughout most of California; wintering birds are concentrated along the coast and in the Central Valley (Remsen 1978).

Among management recommendations for Merlin are to maintain the restrictions on use of persistent pesticides in United States, encourage a ban on persistent pesticide use on wintering areas in Central and South America, and consider moratorium on take for falconry pending determination of status (Remsen 1978).

Habitat and occurrence within GND

Merlin are reported from estuarine, foredune, dune swale, coastal dune scrub, wetlands, riparian, oak woodland, and eucalyptus forest habitats (Table 6.8). They are transient migrants in the GND and occur earliest in early fall and have generally departed by the end of winter (Marantz 1986).

Habitat in other areas

Merlin are seldom found in heavily wooded areas, or open deserts. They prefer coastlines, open grasslands, savannahs, woodlands, lakes, wetlands, edges, and ponderosa pine and montane hardwood-conifer habitats.

Present status within GND

Merlin are rare transients, occasionally sighted by birders visiting Oso Flaco Lake and Santa Maria River Mouth.

Life history

Although merlin are widespread throughout the northern hemisphere, they are uncommon nesters anywhere within their range. They are not known to breed in California. Like all falcons, merlin do not build a nest, but instead take over old nests of other large birds. They are adaptable and use cliff ledges, tree holes, or may nest on the ground. In recent years, merlin has bred more frequently in midwestern cities, using old crow or raven nests (Sibley et al 2001; Alderfer 2006).

Merlin either take prey on the wing, often flying low over the terrain, or will hunt from a perch and ambush prey. Primary prey is birds, sometimes ones as large as itself. Bird species present in the GND which are known to be taken by merlin include: bohemian waxwing, house sparrow, horned lark, song sparrow, brown headed cowbird and several species of sandpipers (Konrad 2004). Merlin, especially the fledglings, also take insects, especially dragonflies, small mammals, and lizards, (Konrad 2004; Alderfer 2006).

Merlins are uncommon winter migrants from September to May in most of the western half of California below 3900 ft elevation. They typically migrate south in the fall to wintering sites in the lower continental US and further south. Some merlin subspecies populations are sedentary, such as the black merlin of the Pacific Northwest, however, and the prairie merlin subspecies recently began wintering in Midwestern U.S. cities, feeding on birds and rodents (Alderfer 2006). Marantz (1986) indicated that most individuals present in San Luis Obispo County are probably *F.c. columbarius*, the taiga merlin, a subspecies that migrates to South America (Alderfer 2006). Black merlin are also known from California (Konrad 2004)

Potential effects of invasive plant species control methods

Because of a similarity in diets (primarily passerine birds), but also including some shorebirds (charadriforms), the potential that merlin may be affected in some way by current invasive weed control methods in the GND is considered minimal, generally similar to that for Cooper's hawk.

Other common names

Pigeon hawk

Subspecies

Three are recognized: prairie, or richardsons, merlin (*F. c. richardsonii*); taiga merlin (*F. c. columbarius*); and black merlin (*F. c. suckleyi*).

Literature cited
Alderfer, J. 2006.

Konrad, P. 2004.

Marantz, C. 1986.

Remsen, J.V. Jr. 1978a.

Sibley, D. et al. 2001.

Additional information sources

Bent, A. C. 1938.

Polite, C. 1983- B128.

Prairie falcon ***Falco mexicanus***

Status

Prairie falcon are a Category 2 special-status species.

Similar to other birds at the top of the food chain, prairie falcon numbers were impacted by organochlorine pesticides prior to the 1972 ban on DDT. This ban in North America, coupled with the fact that prairie falcons do not migrate much further south than northern Mexico (and therefore generally not exposed to areas where hazardous pesticides are still used), has resulted in a stable, perhaps increasing, population of prairie falcons currently estimated at more than 5,000 pairs in North America (Alderfer 2006; www.birdsof prey.blm.gov/prfalcon).

Habitat and occurrence within GND

In the GND, prairie falcons fly over estuarine habitat at the Santa Maria River Mouth (Unocal 1999-2004; Tom Edell Morro Coast Audubon Society, written communication). Along coastal San Luis Obispo Co., prairie falcon are rare and probably only occur as transients and winter visitants (Marantz 1986).

Habitat in other areas

Their habitats range from annual grasslands to alpine meadows, but they are associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas (www.birdsofprey.blm.gov/prfalcon). They are not found in northern coastal fog belt, and uncommon along the coastline (Polite and Pratt 1983-B131).

Present status within GND.

Few prairie falcons pass through the GND. The North American population is increasing (Alterfer 2006), and it is therefore likely that prairie falcons will continue to occur sporadically in various GND habitats during winter migrations.

Life history

Prairie falcon are uncommon, either as residents or migrants, throughout the more arid interior regions of the western United States. They breed in the western United States. Falcons that nest in California spend at least part of their time in the Great Plains (www.npwrc.usgs.gov/resource). The nest is usually a scrape on a sheltered ledge of a cliff overlooking open terrain with canyons, cliffs, escarpments, and rock outcrops. Breeding occurs from mid-February through mid-September, and peaks between April and early August. Adults may live as long as 13 to 20 years. The degree of human disturbance around nest sites affects nesting success. Successful nest sites are difficult for humans to access with fewer disturbances than unsuccessful sites more easily accessible by humans (www.npwrc.usgs.gov/resource).

Prey taken by prairie falcons change with the season. Small mammals, primarily ground squirrels, constitute the majority of their diet during the late winter-early summer breeding season, switching to birds during the winter (www.npwrc.usgs.gov/resoruce). Potential prairie falcon prey species within the various GND habitats include insects (grasshoppers, crickets and dragonflies), scorpions, various mammals (ground squirrels, woodrats, pocket gophers, cottontails, jackrabbits), and lizards (horned lizards). Prairie falcons also take birds such as mallard and other ducks, rock dove, mourning dove, western meadowlark, European starling, swallows, swifts and sparrows. In winter horned larks may be a such an important food source for prairie falcons as to warrant the observation that “as go the horned larks so goes the prairie falcon” (www.birdsofprey.blm.gov/prfalcon; www.npwrc.usgs.gov/resource).

F. mexicanus forages mostly during the early morning and late afternoon except when feeding nestlings or prey are scarce. A variety of hunting techniques have been identified including perch and wait, low level hunting, hopping around on the ground for insects, insect hawking (taking prey on the wing), but also including piracy (taking of prey from other birds) and nest robbing (www.birdsofprey.blm.gov/prfalcon).

Potential effects of invasive plant species control methods

Although prairie falcon take rodents and other small mammals, insects and birds that may potentially come into contact with the herbicides currently applied in the GND, these falcons are not expected to be adversely affected by invasive species treatments because: 1) the herbicides in current use have been shown to have relatively minor, if any, direct impacts on vertebrate populations because they are specific to metabolic pathways present in plants but not vertebrates (referenced previously); 2) the area affected by herbicide application is relatively small (ca 10%; Chesnut 1999) of the total area of the GND; and 3) the method of herbicide application is highly specific for the target plant with negligible over-spray.

Literature cited

Alderfer, J. 2006.

Chesnut, J. 1999.

Polite, C. and J. Pratt. 1983-B131.

Additional information sources

Skinner, M. P. 1938.

Snow, C. 1974b.

Peregrine falcon ***Falco peregrinus anatum***

Status

Peregrine falcons are a Category 1 special-status species.

Peregrine falcons are considered by many to be the ultimate raptors. Their plight following the wide-spread use of organochloride pesticides, principally DDT, in the later 1940's is well known. Bioaccumulation of this compound up through the food chain ultimately to the apex predator peregrine falcon caused catastrophic reproductive failures. It was placed on the federal Endangered Species List in 1970 at which time no peregrines nested successfully east of the Mississippi River and only two nesting pairs were known in California (www.ventana.sierraclub.org). These chemicals were banned in the US and other North American countries in 1972. With this ban, coupled with several captive breeding programs (one local example of which is the Santa Cruz Predatory Bird Research Group (2005) associated with the University of California Santa Cruz), and effective management of wild pairs, these falcons recovered from almost certain extinction (Alderfer 2006; www. ventana.sierraclub.org).

Numbers of peregrine falcon are now increasing and recovery objectives have been met in most areas. On August 25, 1999, the American peregrine falcon was removed from the USFWS endangered species category for their entire range. Within California, there are currently an estimated 300 pairs of peregrine falcon (www.ventana.sierraclub.org).

Although hundreds of nest sites are in wildlife refuges, national, state and provincial parks and remote wilderness areas, the birds forage outside these protected areas and require continued protection. To preserve recovery, required habitat for breeding, wintering, foraging and roosting areas need protection.

Habitat and occurrence within GND

The relatively uncommon peregrine falcon occurs year round and may represent resident birds or migratory individuals. Several researchers (Smith, et al 1976; Entrix, Inc. 1996; Unocal 1999-2004) report peregrine observations during their studies. In the GND, peregrine falcons have been reported over estuarine, foredune, dune swale, coastal dune scrub and wetland habitats. Burton and Kutilek (1991) and many recent visitors to the GND report peregrines to consistently forage and roost in the vicinity of Oso Flaco Lake. Point Sal is noted as a historic nesting site for peregrine falcons (Santa Barbara County Parks Dept. 2003). Peregrine falcons are known to nest, and successfully fledge up to 2 (sometimes 3) birds, at aeries located in Shell Beach, Avila Beach and Diablo Canyon (Diablo Rock) for over a decade (J. Blecha, pers. obs., 1984 to 2006)

Habitat in other areas

Peregrine falcons occur worldwide in almost any habitat but are most frequently seen around aquatic habitats such as lakes, rivers, or coastal shorelines (Alderfer 2006). Riparian areas and coastal and inland wetlands are important habitats yearlong, especially in non-breeding seasons.

Present status within GND.

Breeding pairs and fledgling peregrines are regularly observed flying over the dunes. These birds may be resident birds fledged from local nest sites including Shell Beach, Avila Beach, Diablo Rock or the well known site at Morro Rock, or they may be migrants on their seasonal peregrinations. The sightings appear to be fairly regular and indicate a continued presence in the various GND habitats.

Life history

Peregrine’s breed from early March to late August near wetlands, lakes, rivers and nearshore ocean waters on high cliffs, banks, dunes, mounds and offshore rocks such as Morro Rock and Diablo Rock in the local area. Their nest is a scrape on a depression or ledge in an open site. Peregrines will nest on human-made structures, and occasionally uses tree or snag cavities or old nests of other raptors. Clutch size ranges between 3 to 7 eggs, usually 3-4 and successful pairs in a healthy population fledge 2.2 to 2.5 young (SCPBRG 2005).

Although superb fliers, wild peregrines initiate a major portion of hunting from a high spot such as a prominence or tall tree. Most prey are taken on the wing and consists of birds ranging in size from song birds and shore birds up to ducks, geese and even herons, but most prey species are the size of doves and pigeons (Sibely et al 2001). In some areas, bats are important prey and young birds may take dragonflies (Sibely et al. 2001). They are also known to take rodents which, in some areas of high rodent (lemming) abundance during breeding season, may be more important than birds in their diet (www.esrpweb.scsustan.edu/speciesprofiles/). However it is the spectacular aerial maneuvering of a peregrine falcon pursuing and killing another bird in flight for which these falcons are most well known. They have been measured at speeds of 247 miles per hour during a dive with the feeling that they could go even faster (Alderfer 2006).

Golden eagles, great horned owls, raccoons and other mammals may prey on young peregrines. Peregrine falcon may compete with ravens and prairie falcons for nest site.

<u>Potential effects of invasive plant species control methods</u>

Current exotic plant management practices in the GND are not expected to affect peregrine falcons for reasons similar to those explained above for the prairie falcon and other raptors.

Peregrine falcon have survived pesticide poisoning from extremely powerful and persistent pesticides. In the GND, peregrine's may continue to be exposed to persistent pesticides due to the legacy pesticide DDT and its derivatives that continue to flow down the Santa Maria River from sequestered agriculture soil sources. Shorebirds preying on contaminated sand crabs documented at the mouth of the Santa Maria River may accumulate and transfer this long lasting toxin to peregrines and other birds of prey that may kill and consume these contaminated birds. Controlling runoff of irrigation waters from nearby agricultural lands may be necessary to break the chain of this localized source of non-biodegradable, highly toxic chemicals that pose at least a potential problem of bioaccumulation in apex predators including raptors.

<u>Literature cited</u>

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SCPBRG (Santa Cruz Predatory Bird Research Group). 2005.

Sibley, D.et al. 2001.

www.ventana.sierraclub.org. Web site accessed April 2005.

<u>Additional information sources</u>

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Cade, T. J., J. H. Enderson and J. Linthicum, 1996.

Harlow, D.L. 1978.

Short-eared owl ***Asio flammeus***

Status

Short-eared owls are a Category 2 special-status species.

The loss of inland marshes, meadows and coastal wetlands has contributed to the serious decline of *A. flammeus* over much of its range (Audubon Society 2002-187). Pesticides may accumulate in the owl through its prey, especially during winter when short-eared owls often occur in agricultural areas, but this has not been studied.

Habitat and occurrence within GND

In the GND, a few short-eared owls have been reported in estuarine, coastal dune scrub, wetland and riparian habitats (Smith, et al. 1976; Unocal 1999-2004).

Habitat in other areas

Short-eared owls are found in open country, such as grasslands, marshes or meadows. In winter, they sometimes forage over fallow agricultural fields.

Present status within GND.

Short eared owls are uncommon in the dunes during winter. They were reported in the mid-1970s by Smith et al. (1976) and not observed again until the early 2000s (Unocal 1999-2004). They may have been absent from the dunes for several decades or perhaps just not observed. The species is quite rare, however, and considered an uncommon migrant, recorded only in winter.

Life history

One of the world's most widespread owls. In North America, short-eared owls breed from Alaska to Labrador south across approximately the upper third of the U.S. Their breeding season usually begins in late April (Audubon Society 2002-187). Wintering birds migrate as far south as Florida, central Mexico, and Baja California (Cornell Lab of Ornithology 2003).

Short-eared owls mainly hunt at dawn and dusk but may also hunt during the daytime. Primary prey are small rodents (mice, voles, shrews) plus rabbits, bats, small birds, (field sparrows) and invertebrates such as grasshoppers, beetles, and cutworms (Audubon Society 2002-187). These owls have a tendency to wander and be somewhat nomadic, often moving to areas with high rodent populations to settle and breed (Audubon Society 2002-187).

Potential effects of invasive plant species control methods

Since they prey primarily on rodents, which as vertebrates are little affected by the herbicides used in the GND, short-eared owls are not expected to be adversely impacted by current invasive plant control activities.

<u>Other common names</u>
Cat owl

<u>Literature cited</u>
Audubon Society. 2002-187.

Cornell Lab of Ornithology. 2003

Holt, D. W.,and S. Leasure. 1993.

Long-eared owl ***Asio otus***

<u>Status</u>
Long-eared owls are a Category 2 special-status species.

Long-eared owl (*Asio otus*) populations are mainly limited by land development leading to a decline in suitable nest sites and a decrease in prey abundance, but other factors include forest thinning and the conversion of softwood forests to hardwood forests (Remsen 1978-69). Destruction of lowland riparian woodland has played a role in the decline of long eared owls, but the absence of this species from existing riparian areas and its disappearance from many areas before the habitat was destroyed indicates that other factors are involved. Road kills by high-speed cars may have an impact on populations, as the birds seem very prone to collide with autos (Remsen 1978-69).

Once a common to abundant resident in many parts of California, sightings of long-eared owls are now unusual, although this secretive species may be more common than the few recent records indicates. They have not bred in the Santa Barbara area since 1972 (Remsen 1978-69).

California Department of Fish and Game Recommendations: (1) Protect lowland riparian habitat, (2) Conduct surveys to determine population status (Remsen 1978-69).

<u>Habitat and occurrence within GND</u>
Long eared owls occur in dune swale, coastal dune scrub, riparian, oak woodland and Eucalyptus forest habitats of the GND (Smith, et al 1976, Entrix, Inc. 1996; Unocal 1999-2004).

<u>Habitat in other areas</u>
Long eared owls are found in thick woods; roosts in dense stands of evergreens or vine-covered thickets; breeds in woodlands or riverine woodland belts; forages in openings and old fields.

Present status within GND.

Long eared owls were first reported in the mid-1970s, but not reported in studies again until the mid-1990s. They may have been absent from the GND for several decades, but now appear to have returned in the last decade. The species is quite rare, however, and considered an uncommon migrant, but recorded from all seasons (Table 6.8).

Life history

Examinations of owl pellets reveal long-eared owls forage mainly on mice and voles but also consume rats and other rodents, young rabbits, and occasionally small birds or snakes that it takes on the ground (Bent 1937c). They usually hunt in fields and other open areas, but occasionally also in woodland and forested habitats (Polite 1983-B272). Long-eared owls are more strictly nocturnal than any other North American owl except the northern saw-whet (*Aegolius acadicus*). Their day roost is a dense tree or thicket (Alderfer 2006).

The species breeds from northern United States and Canada south to southern California beginning in mid-April (Remsen 1978-69). Large, abandoned nests of other birds or squirrels are used by these owls; occasionally they nest in hollows on the ground. Partial southward migration from the northern part of the range occurs in the fall. The winter range extends south to Baja California, Mexico (Remsen 1978-69). Alderfer (2006) shows a range map with a year round population of long-eared owls, separate from the main population, along coastal southern California, including the GND, and, while these owls are not known to breed in the area, it is possible that they may at some future time.

Northern harriers and long-eared owls may compete for prey; while red-shouldered hawks may compete for nest sites. Great horned owls may prey on young long-eared owlets.

Potential effects of invasive plant species control methods

Long-eared owls are uncommon in the GND and may be expected at any time of the year. They prey primarily on rodents, which as vertebrates are little affected by the herbicides currently in use in the GND, and are therefore not expected to be adversely affected by current restoration activities.

Other common names

Cat owl

Literature cited

Bent, A.C. 1937c.

Polite, C. 1983-B272.

Remsen J.V., Jr. 1978-69.

<u>Additional information sources</u>

Cornell Lab of Ornithology. 2003.

Grinnell, J. and A.H. Miller. 1944

Burrowing owl *Athene cunicularia*

<u>Status</u>

Burrowing owls are a Category 2 special-status species.

This species, formerly a common, even locally abundant, permanent resident throughout much of California, has been an almost statewide decline California for the last half-century (www.biologicaldiversity.org/swcbd/species/b-owl). Despite several recent attempts, the burrowing owl is not currently formally listed under the California Endangered Species Act due in part to an alleged lack of information and issues around analysis of population trends (Calif. Burrowing Owl Consortium [CBOC] minutes, Feb. 2004). It appears that, while, statewide, some individual burrowing owl population may be increasing, there is concern that the species is imperiled with extinction in a significant portion of its range (CBOC minutes, Sept. 2004). Of the 9,000 to10,000 pairs of burrowing owls in the state, over 70% occur in the Imperial and Colorado River Valleys (CBOC minutes, Sept. 2004).

Conversion of grasslands and pasturelands to agriculture and destruction of ground squirrel colonies, decreasing the number of rodent burrows potentially available to the owls for nest sites, have been the main factors causing the decline of the burrowing owl population. Assimilation of poisons applied to ground squirrel colonies has probably also taken a toll. The owls' propensity for nesting in roadside banks also makes them particularly vulnerable to roadside shooting, being hit by cars, road maintenance operations, and general harassment (Remsen 1978). Collisions with rotor blades at commercial wind-farms, such as at Altamont Pass, California, are cited as significant causes of burrowing owl mortality, as well as for several other raptors (CBOC minutes, Feb. and Sept. 2004). Conservation efforts, however, have increased the species' range in Florida (Cornell Lab of Ornithology 2003).

Among the conservation recommendations made by the California Department of Fish and Game and other special interest groups such as the California Burrowing Owl Consortium (www2.ucsc.edu/scpbrg/mitigation) were to keep a distance of 150 ft. from occupied burrows from September through January and 225 ft. from breeding burrows from February through August.

Habitat and occurrence within GND

In the GND, burrowing owls have been reported in active sand, dune swale and coastal dune scrub habitats (Smith, et al 1976; Unocal 1999-2004). Amateur birdwatchers also find burrowing owls in the GND on a regular basis (Tom Edell, Morro Coast Audubon Society written communication). Within the GND, burrowing owl has been observed around materials such as cement blocks and pipes in the GOF (M.Siemens, LFR, pers. comm. 2005).

Habitat in other areas

Burrowing owls are unusual among raptors for their close association with the ground, as opposed to more elevated platforms such as trees and ledges, for roosting and nesting. They live in dry, open areas with no trees and short grass and can be found on golf courses, cemeteries, airports, vacant lots, university campuses, pastures, and prairie dog towns (Cornell Lab of Ornithology 2003). Burrowing owls have adapted to man-altered environments as development and agricultural expansion reduced natural grasslands (www.biologicaldiversity.org/swcbd/species/b-owl). The presence of non-native vegetation such as annual grasses and mustard does not preclude the presence of burrowing owls in other areas of San Luis Obispo Co. (RareFind3.1).

Present status within GND.

Burrowing owls continue to be observed within the GND on a regular basis during the winter months (Mitch Siemens, LFR, pers. comm. 2005; Tom Edell, MCAS, pers. comm.).

Life history

Burrowing owls nest from February through August in almost any open country from native grasslands and scrub communities to airports and golf courses (Alterfer 2006). The owls use burrows not only as nest sites but for general protection, shelter and stop-over sites during winter migration (www2.ucsc.edu/scpbrg/owls). The burrows are commonly unused rodent burrows, primarily ground squirrels or in other areas prairie dogs, but may also be badger, armadillo, skunk or desert tortoise burrows. The western subspecies, *A. cunicularia hypugaea*, is less inclined to dig its own burrow, which it may do in soft soil, than other subspecies (Alterfer 2006). They often collect mammal dung in and around its burrow, which attracts dung beetles, which the owl then captures and eats (Cornell Lab of Ornithology 2003). Around the Altamont Pass in California, breeding owl activity is low in February, peaks in March with mostly adults and pairs, drops off in April when females are incubating; juveniles emerged in late May (CBOC minutes, Feb. 2005).

Lack of adequate unused rodent burrows may be a factor in the reductions of burrowing owls in some areas. Reduction of ground squirrels due to expanding agricultural areas and rodent control programs limit the number of potential burrows available to the owls. However, they appear to be adaptable and will use artificial burrows and other man made materials such as wood, asphalt, and concrete debris to burrow in, under and around (www2.ucsc.edu/scpbrg/owls).

Burrowing owl appears to be diurnal because they are often be seen roosting during the day near their burrows. They are, however, generally considered nocturnal or at least crepuscular (dawn or dusk) (www.delta.dfg.ca.gov/burowl). Their diet consists mostly of insects, scorpions, small mammals, reptiles, amphibians, other birds and carrion which it catches with its feet while walking, hopping, or running along the ground (www.delta.dfg.ca.gov/burowl). Occasionally, it will take prey by flying from a perch. It catches more insects during the day and more mammals at night (Cornell Lab of Ornithology 2003).

Known predators include foxes, coyotes, skunks, raccoons and snakes, as well as dogs and cats, and other raptors (hawks, eagles, other owl species) (www.biologicaldiversity.org/swcbd/species/b-owl).

Within California, burrowing owls may be resident, migratory or vagrants. Migratory, or winter, birds may come into the state from other areas in their southwest range following breeding or may be in-state birds. Burrowing owls demonstrate a high site fidelity for breeding sites and even specific burrows (www2.ucsc.edu/scpbrg/owls).

Potential effects of invasive plant species control methods

Probably the greatest threat to burrowing owls in the GND is the disruption of roosting birds by invasive weed management activities. One recommended guideline is to maintain a distance of 150 ft. from any observed owl. Ingestion of insects that have come into contact with herbicides currently used in the GND are unlikely to have an effect on burrowing owls for reasons stated previously including the generally held opinion that vertebrates are little affected, if at all, by the metabolic activity of the herbicides used because the metabolic pathway affected by the herbicide is not present in vertebrates.

Literature cited

California Department of Fish and Game (CDF&G). 2004a. Rare Find3:

California Burrowing Owl Consortium (CBOC). 2004. [www2.ucsc.edu/scpbrg/mitigation. Accessed October 2005].

Cornell Lab of Ornithology. 2003.

Remsen, J.V. Jr. 1978a.

Haug, E. A., B. A. Millsap, and M. S. Martell. 1993.

<u>Additional information sources</u>

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Zarn, M. 1974b.

6.4.8 Non-passerine Land Birds

Birds confirmed to occur in this group in the GND are in six orders and the seven families listed below with the number of GND species in each family indicated parenthetically:

Caprimulgidae	Nighthawks, Poorwills	(2 species)
Apoididae	Swifts	(3 spp.)
Trochilidae	Hummingbirds	(6 spp.)
Alcedinidae	Kingfishers	(1 sp.)
Picidae	Woodpeckers	(7 spp.)
Columbidae	Pigeons, Doves	(4 spp.)
Cuculidae	Cuckoos, Roadrunners	(2 spp.)

A total of 25 species of non-passerine land birds are confirmed to occur in the GND. Appendix D lists these species, the reference for their confirmed observation and the GND habitats where observed. Table 6.9 presents their relative abundance and occurrence in the GND. From this Table 6.9, 13 species are considered residents and 7 are known to breed in the GND. The presence of chimney swifts are unconfirmed (Appendix D; Table 6.9).

CONFIRMED NONPASSERINE LAND BIRDS		Relative Abundance			Seasonal Observations				Breeding Locale
Scientific Name	Common Name	Oso Flaco Lake	ODSVRA	GOF					
Caprimulgidae	**Goatsuckers**								
Chordeiles minor	Common Nighthawk	-	Incidental	R					Canada to Panama
Phalaenoptilus nuttallii	Common Poorwill	-	-	U (S), R (W)		Su	F		**GND**, se. Brit Col, w US-cen Mex
Apoididae	**Swifts**								
Aeronautes saxatalis	White-throated swift	Incidental	-	C (Res)		Su			s Brit Col & w US to Honduras
Chaetura vauxi	Vaux swift	R	-	C (M)	Sp				w. No. America to Venezuela
Cypseloides niger	Black swift	Incidental	-	U (M)	Sp				se Alaska-Costa Rica, W.Indies
Trochilidae	**Hummingbirds**								
Archilochus alexandri	Black-chinned hummingbird	-	-	R (M)		Su			w. US, n. Mexico
Calypte anna	Anna's hummingbird	C	C	C (Res)	Sp	Su	F	W	**GND**, w. US (coastal)
Calypte costae	Costa's hummingbird	R	-	R (W), U(M)	Sp		F	W	sw. US, mw. Mexico
Cynanthus latirostris	Broad-billed hummingbird	-	-	R (M)			F		sw. US to s. Mexico
Selasphorus rufus	Rufous hummingbird	U	-	C (M)	Sp			W	nw. North America
Selasphrous sasin	Allen's hummingbird	C	-	C (Res)	Sp	Su	F	W	**GND**, coastal CA
Alcedinidae	**Kingfishers**								
Ceryle alcyon	Belted kingfisher	C	-	C (Res)	Sp	Su	F	W	Alaska, Canada to s. US
Picidae	**Woodpeckers**								
Colaptes auratus	Northern flicker	C	U	C (Res)	Sp	Su	F	W	**GND**, Alaska, Canada to Nicaragua
Melanerpes formicivorus	Acorn woodpecker	-	-	U (Res)	Sp	Su	F	W	w. US to Columbia
Picoides nutallii	Nuttall's woodpecker	C	U	C (Res)	Sp	Su			**GND**, California, nw Baja
Picoides pubescens	Downy woodpecker	C	R	C (Res)	Sp	Su	F	W	**GND**, Alaska, Canada to s. US
Picoides villosus	Hairy woodpecker	-	-	U (Res)	Sp	Su	F	W	Alaska, Canada to Panama
Sphyrapicus ruber	Red-breasted sapsucker	-	-	U (W)			F	W	se. Alaska to Baja California
Sphyrapicus varius	Yellow-bellied sapsucker	-	-	C (W)		Su			across Canada
Columbidae	**Pigeons, Doves**								
Columba liva	Rock dove (pigeon)	-	-	C (Res)	Sp	Su	F	W	Canada, US, central America
Streptopelia decaocto	Eurasian collared dove	-	-	C (Res)	Sp	Su	F	W	GND?, India, Eurasia, s.&w. US
Zenaida macroura	Mourning dove	C	C	C (Res)	Sp	Su	F	W	**GND**, se Alaska, s. Can-Panama
Cuculidae	**Cuckoos and Allies**								
Coccyzus americanus	Western yellow-billed cuckoo	Incidental	-	R (M)	Sp				s. Canada to Mexico, W. Indies
Geococcyx californianus	Roadrunner (Greater)	-	-	U (Res)	Sp	Su	F	W	sw. US to cen Mexico

Table 6.9 Confirmed and Unconfirmed Non-passerine Land Birds

UNCONFIRMED NON-PASSERINE LAND BIRDS		Relative Abundance			Seasonal Observations				Breeding Locale
Scientific Name	Common Name	Oso Flaco Lake	ODSVRA	GOF					
Apoididae	**Swifts**								
Chaetura pelagica	Chimney swift	-	-	R(M)	Sp				e. N. America; winters in Peru
Columbidae	**Pigeons, Doves**								
Columba fasciata	Band-tailed pigeon	-	-	-	-	-	-	-	sw. Brit Col., w. US to Argentina

NOTES:

OSVRA	-- Oceano Dunes State Vehicular Recreation Area	Res	Resident	Sp	Spring
GOF	-- Guadalupe Oil Field	C	Common at some time	Su	Summer
GND	-- Breeding reported in Guadalupe-Nipomo Dunes	U	Uncommon, even when most abundant	F	Fall
-	-- Not observed; No data	R	Rare, even when most abundant	W	Winter
		M	Migrant		

Table 6.9 Confirmed and Unconfirmed Non-passerine Land Birds (continued)

Habitat relationships

Summarizing of the characteristics of this group of birds regarding habitat preferences, or migrations or feeding preferences, is necessarily fairly general given that they are comprised of species from 6 different orders. These non-passerine land birds occur in all GND habitats inland of the foredunes except for active sand (Appendix D). With a few exceptions (e.g., hummingbirds, mourning dove), they feed primarily on insects at least at some times of the year and may supplement their diet with seeds and berries. They generally forage for insects in open areas but sometimes forage in thick vegetation. Plant material is harvested directly from the plant or gleaned from the ground. Nesting areas, for those birds that breed in the GND, and roosting areas can either be in thickets or on the ground.

Potential effects of invasive plant species control methods

As for most other birds in the GND, potential impacts to non-passerine land birds would be expected to occur primarily from the use of herbicides and controlled burns to control the invasive plants. Controlled burns could reduce the numbers of insects such as grasshoppers, beetles, flies, and leptidopterans potentially available as prey to the birds. Similarly, some ground foraging birds may ingest invertebrates inadvertently sprayed with herbicide. In the first instance, the area affected by controlled burns is essentially negligible when compared to the rest of the habitat unaffected by burns in the GND. In the second instance, the number of insects sprayed and then eaten by these birds would probably be fairly small and, in any case, the herbicides used in the GND are not expected to have a detrimental effect on birds since the enzyme pathway affected by the herbicide to kill plants does not exist in vertebrates. Invertebrates, primarily insects, are most affected by herbicides brought about by a change in the structure and composition of the plant community following application. In the GND the expected change in the vegetation in treated areas will be a reversion to native species that, in the long term, will be a benefit to the invertebrates and, in turn, to the native birds as well as other animals.

Special-status species

Eight of the 25 nonpasserine land birds are special-status species (Table 6.1; Appendix D). None are Federally listed as endangered or threatened although the western yellow-billed cuckoo is under consideration for federal listing (RareFind3). Populations of two swift species, black and Vaux, are California Department of Fish and Game Species of Concern, and five species (1 swift, 3 hummingbirds and 1 woodpecker) are under careful scrutiny by the Audubon Society's WatchList.

Brief accounts of nonpasserine land bird families in the GND

Aspects of the biology pertinent to the GND of the non-passerine land birds within one family are relatively similar. Therefore rather than present species accounts for each special-status species, all special-status species within a single family will be treated as one species account, with available information relevant to the GND presented for each of these species. Bird families that contain no special-status species are briefly described.

Caprimulgidae goatsuckers

Caprimulgids are sometimes thought of as the nocturnal equivalent of swifts and swallows in that they typically hawk insects from the air at night. Their prey is a variety of flying insects including gnats, mosquitoes, moths, flies and sometimes vertebrates including small birds that they capture from mainly open habitat (Sibley et al 2001).

Neither nighthawks nor poorwills are of special-status. Common nighthawks, widespread throughout North and Central America and migrants into South America, however, are in decline throughout their breeding range (Canada to Panama) perhaps associated with pesticide use, loss of open habitats, and road kills. Common poorwills are widespread in the western U.S., are not considered threatened and there is no evidence of decline (Green B277). Grazing and forest fires, which create clearings, may increase the nesting and roosting habitat for both species (Sibley, et al 2001).

Common nighthawk have been reported only once in 1990, an incidental observation during wildlife census at the Oceano Dunes SVRA (Kutilek et al 1991. Either their occurrence in the GND is quite rare or they are rarely observed, perhaps because of their nocturnal behavior.

Common poorwill are uncommon migrants occurring in summer and fall in the GND (Smith et al 1976, Dames & Moore 1979; Entrix 1996; Unocal 1999-2004). They are reported to breed in the GND (Dames & Moore 1979). Audubon Society birders report seeing poorwills occasionally in recent years (T. Edell MCAS, written communication).

Caprimulgids in the GND are not expected to be affected by current invasive plant species control methods. Their primary prey of small, night-flying insects would likely not come in contact with herbicides since surfactant additives in the herbicides may be expected to reduce their flying ability. Even if herbicide contacted insects were eaten, however, the herbicides used in the GND are not expected to be detrimental to birds since the enzyme pathway affected by the herbicide to kill plants does not exist in vertebrates.

<u>Literature cited</u>

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Sibley, D. et al. 2001.

Apodiae **swifts**

Swifts are essentially an aerial species, spending much of their lives on the wing. As their family name (“without feet”) suggests, they have tiny, but strong, feet and generally “perch” on vertical surfaces (Alderfer 2006). All three of the swifts known to occur in the GND (Table 6-9) are special-status species (Vaux’s swift, black swift and white-throated swift) and are described in detail below.

Special-status species account

Vaux’s swift ***Chaetura vauxi***

Black swift ***Cypseloides niger***

White-throated swift ***Aeronautes saxatalis***

Status

Vaux’s swift and the black swift are Category 2 special-status species (sensitive).

White-throated swift is a Category 3 special-status species (of some concern).

Swifts are difficult to survey because of generally inaccessible nest sites and high-flying habits. As an example, Sibley et al. (2001) states that black swifts are declining while Alderfer (2006) suggests the population is apparently stable due to inaccessible nest sites. Similarly, Vaux’s swift is either in decline due to loss of old growth forests in the Pacific Northwest (Alderfer 2006) or are stable (Sibley et al. 2001). White-throated swifts are either generally stable with some populations in decline or else seem to be declining (Alderfer 2006; Sibley et al. 2001).

Threats to swifts include: human disturbance, habitat loss, harvesting of nests, collisions with telephone wires, planes and buildings, pesticides (both those that harm birds directly and others that cause reductions in prey numbers), predation by introduced species (for example cats or snakes) (Audubon WatchList 2005). Threats at these sites are not a major problem due to their general inaccessibility. A more likely broad-scale threat is from decreases in aerial insect abundance due to habitat loss and use of pesticides on breeding and wintering grounds (Audubon WatchList 2005).

Habitat and occurrence within GND

When black swifts are observed, they are found at or near Oso Flaco Lake flying with and above the swallows in spring. White-throated swifts are reported as common residents and Vaux’s swift are common migrants in the GOF (Table 6.9). All swifts are associated with wetland habitat, likely feeding on the numerous insects just above the water’s surface.

Habitat in other areas

Generally swifts are found near steep slopping rock faces or cliffs (Marantz 1986). However, white-throated and Vaux's swifts are becoming more common in some urban areas and white-throated swifts are known to nest in man made structures such as bridges (Alderfer 2006). The black swift is associated with waterfalls and other damp cliff habitats in western mountains and along rugged coastlines (Alderfer 2006).

Present status within GND.

Earlier studies indicated all three swifts were rare occurrences in the GND. However, more recent studies, and of a longer duration, at the GOF, suggest that white-throated and Vaux's swifts are commonly observed at times and that black swifts continue to be rarely observed spring migrants (Table 6.9).

Life history

Swifts do not perch but rather cling to vertical surfaces such as the cliffs and cave walls that serve as roosting sites. They generally do not land between foraging flights, resting only at nests or nocturnal roosting sites (Sibley et al 2001). This almost constant flight is sometimes described as roosting on the wing. Migration of most swifts, including black, white-throated and Vaux's, which commonly occur together (Alderfer 2006), is in the southerly direction as the weather gets cooler and insects become less abundant. Migration distances are variable between thousands of miles for some populations to a few hundred for others (Sibley et al 2001).

Swifts are insectivores, feeding on the wing (hawking) or gleaning insects from foliage. When hawking, they may fly at very high elevations. They eat a variety of insects within a size range suitable to the species including flies, wasps, bees, bugs and beetles. Ballooning spiders may be a significant part of their diet at certain times and places. Black swifts in particular will often take advantage of swarming insects such as mayflies, ants or termites and will forage a huge distance from their roosts and nests seeking out these aggregations (Sibley et al 2001; Alderfer 2006). Vaux's and white-throated swifts are more generalist feeders and, while they will forage at some distance, they generally remain in fairly close proximity to their nest and roost sites. The local abundance of swifts can shift rapidly in response to climactic conditions (Alderfer 2006).

Black swifts breed very locally in four regions of California, the closest to the GND being the coastal cliffs and mountains of Monterey County (Remsen 1978; Alderfer 2006). Nests have been found only on cliffs behind or adjacent to waterfalls or steep coastal cliffs.

Vaux's swifts are considered fairly common throughout their range and may form large postbreeding or migrant flocks along the California coast (Alderfer 2006). Some birds winter in localized areas in coastal central California but most apparently winter from Mexico south (Alderfer 2006).

White-throated swifts are common throughout their range. They are known to breed on coastal cliffs in central California and to winter from central California south (Alderfer 2006). These swifts readily take advantage of man made structures for nesting and are becoming increasingly more common in urban landscapes (Alderfer 2006).

Potential effects of invasive plant species control methods

Swifts are insectivorous and, although capable of taking insect prey from vegetation, seem to mainly hawk insects on the wing. Since it is unlikely that smaller insects sprayed with herbicides would be able to fly, especially if a surfactant such as crop oil was added, flying insect prey of swifts would be largely free of any herbicide. In any case, the herbicides currently in use in the GND have little if any direct affect on birds that may ingest prey treated with them as the plant metabolic pathway acted upon by the herbicides does not exist in vertebrates.

Literature cited

Alderfer, J. 2006.

Audubon Watchlist. 2005

Sibley, D. et al. 2001.

Additional information sources

Camfield, A. 2005.

Chantler, P. 1995.

Trochilidae **hummingbirds**

Hummingbirds are the only birds that truly hover and are capable of both forward and backward flight. Feeders and garden flowers have allowed population and range increases in some North American species. Of the six species of hummingbirds known from the GND (Table 6.9), three are of special-status and are described below.

Much of the general information about hummingbirds comes from University of Michigan Museum of Zoology web site [cited 24 May 2005 at http://animaldiversity.ummz.umich.edu/site/accounts/information/Trochilidae.html]

Special-status species account

Costa's hummingbird ***Calypte costae***

Allen's hummingbird ***Selasphrous sasin***

Rufus hummingbird ***Selasphorus rufus***

Status

Costa’s hummingbird, Allen’s hummingbird, and the rufus hummingbird are all Category 3 special-status species (of some concern).

All three hummingbird species are listed as code yellow on the Audubon WatchList due to potential loss of nesting habitat. Although little information is available on the overall issues that are causing these declines, potential causes include increased use of pesticides and replacement of native plants by invasive plants (Audubon WatchList 2005).

Habitat and occurrence within GND

Rufous and Allen’s hummingbirds, as well as the ubiquitous Anna’s**,** are found in multiple GND habitats, including foredune, dune swale, central dune scrub, riparian, oak woodland and eucalyptus forest (Smith et al 1976, Dames & Moore 1979, Burton and Kutilek 1991, Entrix, Inc. 1996, Unocal 1999-2004). Anna’s also occur in GND wetland habitat.

Marantz (1986) reports Costa’s hummingbirds are locally an uncommon to fairly common transient in San Luis Obispo County primarily along the coast. They may be present in the GND from March to October (Marantz 1989). Dames & Moore (1979) report Costa’s to be a rare winter migrant in the GND but Marantz (1986) reports no Costa’s along the coast in winter. Costa’s generally nest in recently burned chaparral in inland areas and coastal sage scrub along the coast. They are known to nest in the GND (Marantz 1986).

In Santa Barbara Co., Lehman (1994) notes Costa's hummingbird frequent drier habitats including coastal sage scrub. In migration and winter they are found around exotic plantings (particularly eucalyptus) and hummingbird feeders. Along the coast it is locally fairly common in the coastal sage scrub from Point Sal to Pt. Conception.

Although not special-status species’, two other relatively rare GND hummingbirds deserve mention. Black-chinned hummingbirds are uncommon and infrequently sighted in the GND (Entrix, Inc. 1996, Unocal 1999-2004). They arrive later than other hummers, and are usually in the GND by early April. A bird present in Pismo Beach in September is the latest record of a fall migrant with no winter birds observed. Lehman (1994) did not cite black-chinned in the Santa Barbara Co. portion of the GND, and indicated that their preferred habitats include exotic plantings in residential areas, humming-bird feeders, and patches of tree tobacco (*Nicotiana glauca*) along the coast.

Most rare of the hummingbirds in the GND are broad-billed hummingbirds. They are reported from a single observation at Pismo State Park on 16 November 1985 in suspected riparian habitat (California Bird Record Committee [CBRC] Database 2004).

Habitat in other areas

Hummingbirds feed and nest in a wide variety of terrestrial habitats, their main habitat requirement is a large number of nectar producing flowers. Hummingbirds can be found in habitats from coastal areas at sea level to mountainous areas at an elevation of 5000 m (16,400 ft).

Due to the prevalence of hummingbird feeders and cultivated gardens, hummingbirds can sometimes be found in urban and suburban areas with few natural food sources. There are also some agricultural crops, mainly tropical, that can support hummingbirds.

Present status within GND.

At Oso Flaco Lake, Costa's, rufous and Allen's were reported by Burton and Kutilek (1991) in riparian and other habitats. These three species continue to be reported by Morro Coast Audubon birdwatchers in the Oceano and Oso Flaco areas (T. Edell written communication November 2004). Nesting Allen’s hummingbirds were noted at OFL in 2005 (MCAS 2005).

Among hummingbirds surveyed in the GND, Anna’s are the more commonly sighted. Anna’s were the only hummingbirds reported within the Oceano Dunes SVRA (Kutilek, et al. 1991).

Life history

Hummingbirds’ primary diet of high energy flower nectar is well known. Their adaptations for this lifestyle are considerable and include the ability to hover is one place for a length of time as well as fly forward, backward, sideways up down and even upside down. Their distinctive beaks, specialized for specific types of flowers on which each species feeds, enable them to reach far into the flowers where their bifurcated tongue laps up the nectar (Sibley et al. 2001). They are diurnal and forage throughout the day, with peak activity at dawn and dusk. In order to save energy in very cold circumstances, hummingbirds will go into torpor.

Invertebrates, particularly insects, are now recognized as very important in the diet of hummingbirds (Sibely et al 2001). Insect prey include fliers such as fruit flies, gnats, mosquitoes, and ballooning spiderlets and flora or ground dwelling types such as thrips, aphids, maggots, caterpillars, ants, spiders and insect eggs (Sibley et al 2001). Flying insects are commonly “hawked” on the wing. Hummingbirds also capture insects by gleaning picking prey off leaves and branches. Insects and eggs are also taken by probing cracks and crevices in tree bark. Rufous and Allen’s hummingbirds are known to disturb leaves on the ground and pick off exposed arthropods and their eggs and also take insects attracted to the weeping sap of sapsucker holes. Hummingbirds also pick trapped insects out of spider webs as well as the spiders and their egg masses, which may constitute a major portion of their diet (Sibley et al 2001).

The swift agile flight of Costa's and other hummingbirds and nesting on small branches apparently deter predation (Green 2005). Collisions with windows and predation by domestic cats in populated areas are some known causes of mortality (Sibley et al 2001).

Potential effects of invasive plant species control methods

Hummingbirds are mainly nectar feeders and, as such, are less likely to encounter herbicide applications because of the strict protocols employed in the GND to avoid application to flower-bearing plants. They are, however, insectivorous capable of taking insect prey from vegetation sprayed with herbicides and while the incidence of this is unknown it is probably very low. However, as with all birds, the herbicides currently used in the GND are not known to affect vertebrates if ingested. Smaller flying insects that are potential hummingbird prey such as gnats, midges, and whiteflies are very likely not affected by local applications of herbicides.

Literature cited

Audubon Watchlist. 2005.

California Bird Record Committee (CRBC). 2004. 2004 Database.

Lehman, P.E. 1994.

Green, M. B219.

Marantz, C. 1986.

Sibley, D., et al. 2001.

Alcedinidae **kingfishers**

Belted kingfishers are not special-status species. Within the GND, surveys report kingfishers in estuarine, riverine, wetlands, riparian, beach-dune strand, oak woodland, and eucalyptus forest habitats (Table 6.9; Smith et al 1976, Burton and Kutilek, 1991, Entrix 1996 and Unocal 1999-2004) and have been observed in Black Lake Canyon (McClelland 1988). Kingfishers are GND residents, observed year round. Burton and Kutilek (1991) made 43 observations in their yearlong surveys in the Oso Flaco Lake area. Belted Kingfishers are reported in recent surveys by Unocal (1999-2004). Morro Coast Audubon birdwatchers in the Oceano and Oso Flaco areas also continue to report Kingfishers diving for fish in Oso Flaco Lake and other wetlands in the GND (T. Edell written communication November 2004).

Belted kingfishers frequent streams with clear, slow moving, shallow water in wooded areas but feed in marine, estuarine, lacustrine, and riverine habitats as well (Green

B293). They eat mostly fish but also take amphibians, crayfish, and insects. Young feed on insects initially, larger foods later (Green -B293).

Belted kingfishers would have little interaction with restoration activities in the GND. Roosting sites in eucalyptus trees may be lost if these non-native trees are removed along waterways. As nesting behavior has not been reported from the area, it is unlikely that herbicide contacted insects could be fed to kingfisher young.

<u>Literature cited</u>

Green, M. B293.

McClelland Engineers, Inc. 1988.

Picidae **woodpeckers**

All seven species of woodpecker confirmed to occur in the GND (Table 6.9) are reported from riparian habitat (Appendix D). Four species, northern flicker, acorn woodpecker, downy woodpecker, and hairy woodpecker, occur in the GND during all seasons of the year (residents). Three species nest and raise young in the GND including, importantly, the Audubon's Red Listed Nuttall's woodpecker as well as northern flickers and downy woodpeckers (Table 6.9; Dames & Moore 1979). Two picid species are special-status and are described in detail below.

<u>Special-status species account</u>

Nuttall's woodpecker ***Picoides huttallii***

Red-breasted sapsucker ***Sphyrapicus ruber***

<u>Status</u>

Nuttall's woodpecker and red-breasted sapsucker are Category 3 special-status species (of some concern).

Nuttall's woodpecker is listed on the Audubon WatchList (2005) -- Red (Population size: 100,000-200,000). A permanent resident of oak woodlands, Nuttall's woodpecker's range barely extends outside of California. Although considered common (Alderfer 2006), its limited range, low density, and close association with oak woodlands and riparian zones make it vulnerable to development that encroaches on its habitat (Sibley et al. 2001).

<u>Habitat and occurrence within GND</u>

All core wildlife studies conducted the GND except the earliest study by Smith et al. (1976) report the occurrence of Nuttall's woodpecker. Nuttall's appear to be more limited in habitat use within the GND than the other woodpeckers (Appendix D). Besides riparian, they are found only in dune swale and coastal dune scrub habitats.

Red-breasted sapsuckers were reported by Dames and Moore (1979) and more recent sighting (s) by M. Smith, MCAS (Pers. comm. 2005). Although the habitat of the sightings was not given, it was likely in wooded or riparian habitat.

Although not special-status species, the occurrence of other woodpeckers in the GND is interesting. Northern flicker, acorn, downy, and hairy woodpeckers are consistently found in a greater variety of habitats: foredune, dune swale, coastal dune scrub, oak woodland and eucalyptus forest (Appendix D). Northern flicker represented 0.20 percent (72 observations) of the over 35,000 birds observed in census in the Oso Flaco Lake region and downy woodpeckers represented 0.10 percent (36 observations) of all birds (Burton and Kutilek 1991). Acorn woodpeckers are quite rare along the immediate coast. They are very closely tied to oak savanna and oak woodland habitat. A single observation of an individual circling the beach at the SMRM on 4 November 1978 was unusual (Marantz 1986, Lehman 1994).

Sapsuckers are the least frequently reported Picids. Yellow-bellied sapsuckers are described as an accidental vagrant with one record near the coast in Arroyo Grande (Maranatz 1986, pg 111). They were previously classified as a race of red-breasted sapsucker but any early data separating the former races is lost.

<u>Habitat in other areas</u>

Nuttall's are fairly common, permanent residents more closely associated with oak and riparian woodland habitats of coastal and interior In San Luis Obispo County. They are becoming increasingly more common in urban settings in southern California, presumably as the "urban forests" mature to a stature the Nuttal's woodpecker finds acceptable (www.sdnhm.org/research/birdatlas/focus/woodpeckers.htms).

Red-breasted sapsuckers inhabit moist coniferous forests, oak woodlands and riparian areas of Pacific coastal mountains ranges most of the year but in winter, they are found around deciduous trees orchards and parks (Alderfer 2006). Preferred nesting habitats of red-breasted sapsuckers include montane riparian, aspen, montane hardwood-conifer, mixed conifer, and red fir, especially near meadows, clearings, lakes, and slow-moving streams (Gaines and Granholm 2005). In San Luis Obispo County, red-breasted sapsuckers are uncommon winter visitants occurring in small numbers in oak, riparian and coastal pine forest habitats (Marantz 1986).

Yellow-bellied sapsuckers are rare winter migrant in California. In the east, it occupies deciduous, mixed hardwood and conifer forests of the boreal regions (Alderfer 2006).

Present status within GND.

The collection of these seven Picids continues to be observed in the normal low to accidental density from the GND (T. Edell written communication November 2004).

Life history

All woodpeckers are primarily insectivorous. They probe and excavate for insects, locating them either visually or auditorily and capture them with their tongues. Some may capture insects on the wing (Sibley et al 2001). Many woodpeckers also eat fruit and nuts during non-breeding season and many non-migrants add seeds to their winter diet (Sibley et al 2001). Some woodpeckers, notably acorn woodpeckers, are known for caching food, primarily seeds but also insects, to eat in the winter.

Woodpeckers are generally nonmigratory, resident species. Some undergo seasonal movements, sometimes termed wandering, and a few are fully migratory such as northern flickers and sapsuckers (Sibley et al 2001). Most if not all woodpeckers nest in holes in trees, either living or dead. Snags are important in the ecology of most woodpeckers (Sibley et al 2001).

The red-breasted sapsucker eats insects, especially ants. Parallel rows of 1/4- to 3/8-inch closely spaced holes drilled in tree trunks or branches produce perennial sap wells from which the birds feed on sap, cambium, and other soft tissues and any insects which may get stuck in the sap. Red-breasted sapsucker also feeds on small berries and other fruits. Yellow-bellied and red-breasted sapsuckers are migratory through most of their ranges.

Nuttall's woodpeckers forage preferentially in oaks but acorns make up only a small part of their diet. They creep diagonally across the trunks and branches as they search in crevices and underneath bark; often hanging upside down under limbs as they probe for insects, such as beetles, caterpillars, ants. They also take fruits, berries, poison oak seeds, nuts, and sap (AudubonSociety 2002-145). They require snags and dead trees for nest excavations and are known to nest in the GND (Table 6-9).

Potential effects of invasive plant species control methods

Woodpeckers are not expected to be impacted by methods currently used to control invasive plants in the GND since they forage, roost and nest mainly in larger woody plants that are not the targets for control. Modification of eucalyptus forest habitat may have an unknown impact on food and cover resources used by woodpeckers in the GND. An examination for nest holes of Nuttall’s woodpecker should be made prior to removal of any dead trees or large bushes.

Literature cited

Alderfer, J. 2006.

Audubon Watchlist. 2005.

AudubonSociety. 2002-145.

Gaines D., S. Granholm. 2005.

Lehman, P.E. 1994.

Marantz, C. 1986.

Sibley, D., et al. 2001.

Columbidae **pigeons, doves**

Two of the four confirmed species of columbids (Table 6.9), rock dove (domestic pigeon) and collared doves, are introduced species while mourning doves and band-tailed pigeons are natives. The first three birds are common, year round residents of the GND; band-tailed pigeon is a very rare visitor and a special status species.

The two introduced species are commonly associated with humans, feeding and nesting in urban areas, often in numbers (for pigeons) considered to be nuisance levels. Within the GND, pigeons are found gleaning debris along the beach-strand, and in estuarine, dune swale and coastal dune scrub habitats. The European collared dove is found at wetland and riparian habitats near Oceano Lagoon and campground (M. Smith, Morro Coast Audubon Society, written communication). Neither pigeon nor Eurasian collared dove were encountered at Oso Flaco Lake (Burton and Kutilek 1991) or at the Oceano Dune SVRA (Kutilek et al 1991).

Mourning doves number in the hundreds of millions and hunters harvest tens of millions each year nationwide, but they remain very common (Sibley et al. 2001). GND researchers report mourning doves in continuous habitats inland from the foredune to the oak woodland habitats, but not riverine. Burton and Kutilek (1991) enumerated 155 (0.4% of the birds observed) at Oso Flaco Lake, while Kutilek et al (1991) counted 211 (0.9%) mourning doves in their Oceano Dune SVRA research. Mourning dove successfully reproduce in the GND (Dames & Moore 1979).

Although the diet of mourning dove is primarily seeds, including many species of grasses both native and non-native, it is not known but can be expected that mourning doves may eat the small seeds of veldt grass in the GND. Although speculative, consumption of these seeds by dove in the GND can be expected to be a minor portion of its diet when it is considered that the area affected by veldt grass in the GND is less than 10% of the total area and that the amount of seeds produced compared to that of the native vegetation is relatively small. Even if ingested however, the herbicides currently in use in the GND have little known effects on birds or other vertebrates when ingested incidentally.

Special-status species account

Band-tailed pigeon ***Columba faciata***

Status

Band-tailed pigeons are a Category 3 special-status species (of some concern) due to population declines in their breeding range.

Information on band-tailed pigeons is largely from Audubon Society website (www.audubon2.org).

Habitat and occurrence within the GND

Smith et al (1976) presented band-tailed pigeon, *Columba fasciata*, as present in the GND from a time before 1975. There are no other records of this bird in the GND until 2005 when one was reported in the State Park Campground in Oceano (MCAS 2005)

Habitat in other areas

Band-tailed pigeons are a native pigeon and a permanent resident of San Luis Obispo County, normally associated with oak woodland in the interior zone; their occurrence is irregular in the coastal zone and only rarely occur along the immediate coast (Marantz 1986).

Present status within the GND

On 22 May 2005, one band-tailed pigeon was reported in the Oceano Campground by an MCAS observer who noted it was away from its breeding locality (MCAS 2005).

Life history

In North America, band-tailed pigeons are distributed from southern Alaska to Baja California, Mexico. They breed from British Columbia south into Mexico. Band-tailed pigeons are resident, breeding species in San Luis Obispo County (Marantz 1986). Nests are in trees, primarily oak and conifers in SLO Co., and breeding season is between April and September (Marantz 1986). The SLO Co. population may be somewhat larger in the winter when most of the West Coast population of band-tailed pigeons migrate to wintering areas south of Redding California (Lewis et al. 2003).

This herbivorous bird feeds on acorns, buds, blossoms, young leaves and needles, fruits, nuts, berries, and grains (Lewis et al. 2003). Plants favored by band-tailed pigeons include oaks, elderberry, madrone, buckthorn, dogwood and huckleberry in the Pacific Northwest (Lewis et al. 2003).

Potential effects of invasive plant species control methods

The potential threat of negative impacts to band-tailed pigeons through any activities involved with the control of invasive species in the GND, using current methods, is minimal due, primarily, to the apparently very rare occurrence of the pigeons in the GND and their dietary preference for fruits, berries, seeds and leaves of native vegetation.

Literature cited

Lewis, et al. 2003.

Sibley, D., et al. 2001.

Cuculidae **cuckoos and roadrunners**

Two cuckoo species occur in the GND; the greater roadrunner and the western yellow-billed cuckoo. The latter is a special status species and is described in more detail below.

The greater roadrunner has no special status. However, habitat loss and urban sprawl are major threats to greater roadrunners**,** reducing their potential habitat to patches too small for their large territorial requirement. Greater roadrunners are uncommon residents found year round in the GND (Smith et al 1976, Entrix 1996, Unocal 1999-2004), reported now and then from foredune, dune swale, coastal dune scrub, oak woodland and eucalyptus forest. Audubon Society members report seeing an occasional roadrunner in recent years (T. Edell MCAS, written communication). Although omnivorous, they eat mainly large insects, scorpions, tarantulas, centipedes, lizards, mice and snakes and are one of the few animals that will kill and eat (rarely) rattlesnakes. They feed on prickly pear cactus where available. Prey are captured on the ground but they may jump into the air to catch passing insects. They are non-migratory, preferring to walk or run rather than fly and then they remain airborne for only a few seconds.

Special-status species account

Western yellow-billed cuckoo ***Coccyzus americanus***

Status

Western yellow-billed cuckoo is a Category 1 special-status species (very sensitive).

Western yellow-billed cuckoo are common in some parts of their range, but some populations have been declining in recent years most likely due to habitat loss and fragmentation. Western populations depend on riparian corridors, which are decreasing with increasing development, introductions of exotic plants, and water impoundments among other factors. Other threats include poisoning from pesticides and other environmental contaminants, and collision with towers and tall buildings during their nocturnal migration.

Habitat and Occurrence within GND

Burton and Kutilek (1991) confirmed western yellow-billed cuckoo in the GND during an incidental observation in riparian habitat at Oso Flaco Lake in 1990.

Habitat in other areas

Western yellow-billed cuckoo prefer open woodlands with clearings and a dense shrub layer. They are often found in woodlands near streams, rivers or lakes. Western populations are increasingly limited to riparian corridors (Alderfer 2006). In winter, yellow-billed cuckoos can be found in tropical habitats with similar structure, such as scrub forest and mangroves.

Present status within GND.

Western yellow-billed cuckoos have been reported only once, in 1990, in the GND.

Life history

Western yellow-billed cuckoos are solitary or live in pairs during the breeding season. They may be territorial, but this aspect of their behavior is not well understood. Yellow-billed cuckoos are fully migratory. They migrate at night in small groups or large flocks.

Western yellow-billed cuckoos primarily eat large insects including caterpillars, katydids, cicadas, grasshoppers and crickets. They also occasionally eat bird eggs, snails, small vertebrates such as frogs and lizards and some fruits and seeds. Parents feed their chicks' regurgitated insects.

Potential effects of invasive plant species control methods

Current methods of invasive plant control is not expected to affect western yellow billed cuckoos in the GND because: 1) their presence is very rare in the GND with only one confirmed sighting; 2) they prefer dense riparian areas that are not subjected to intensive weed control measures and; 3) in the unlikely circumstance that they ingested a prey item that had come into contact with a herbicide, they would be little affected as the metabolic pathway acted upon by the herbicides in current use in the GND does not exist in birds or other vertebrates.

Subspecies

Western yellow-billed cuckoo is recognized as *C. a. occidentalis*.

Literature cited

Alderfer, J. 2006.

Sibley, D., et al. 2001.

USFWS. 2006.

6.4.9 Passerines (Perching Birds)

Passeriformes - Oscines [Songbirds] , Suboscines [Tyrant flycatchers]

Introduction

Birds in the order Passeriformes are the perching birds, or passerines. Passerines are among the most familiar of all birds and are widely recognized more as songbirds than perching birds. Roughly, 60 percent of all bird species are passerines, representing about 40 percent of all bird families. One result of the high number of passerine species in a proportionately small number of families is that each family has a great many similar species (Ehrlich, Dobkin and Wheye 1988).

Within the Passeriformes, two suborders (Oscines and Suboscines) are recognized as differing in the nature of their songs. Suboscines are less well developed musically than Oscines and are represented in North America by the Tyrannidae (so called tyrant flycatchers, peewees, phoebes, and kingbirds). The Oscines, divided into about 70 families, are true songbirds in which singing is most highly developed.

General passerine ecology

A few relevant generalizations may be made about the biology of passerine birds. Passerines are all terrestrial birds although some may be associated very closely with aquatic habitats. They occupy virtually every type of terrestrial habitat. Virtually all passerine birds eat insects to a greater or lesser extent depending on the species and several other biological and environmental variables. Conversely, virtually all passerines eat plant material to a greater or lesser extent at some time during the year.

Their movements cover the range from limited movements within a limited range for some endemic species to very long migrations between far north breeding areas and equatorial to southern hemisphere wintering areas. Non-migratory species or those with limited movements (also called dispersal or wandering) tend to have high fidelity for a specific habitat and than those species with wider movements or migrations tend to be observed in a wider variety of habitats (Sibley et al. 2001).

Finally, with the exceptions of some endangered species, there is generally little specific natural history known for most passerine bird species and especially so for birds in the GND habitats. For example, there may be some highly detailed accounts of a species' ecology and natural history in Connecticut which may be useful generally, but what insects or plant material the species feeds on in the winter in the GND or other stops in their migration is left more or less to speculation.

Passerine abundance in the GND

Passerine birds comprise the largest and most diverse assemblage of terrestrial vertebrate wildlife in the GND. The128 confirmed species representing 25 bird families are presented in Table 6.10. Appendix D presents their GND habitat preferences and gives the references verifying their occurrence. The occurrence of an additional 16 species is unconfirmed for the GND at this time (Appendix D; Table 6.10).

Approximately 55% of the bird species observed in the GND belonged to only four families (Appendix D): warblers (Parulidae; 28 species); sparrows, juncos, buntings, towhees (Emberizidae; 17 species); flycatchers, kingbirds, phoebes, peewees (Tyrannidae; 16 species); and blackbirds (Icturidae; 10 species). Warblers are strongly migratory and tyrant flycatchers migrate outside of their breeding ranges while sparrows and blackbirds are short distance migrants or resident species (Sibley et al 2001).

Special status passerine species

Twenty special-status passerines have been observed in the GND (Table 6.1; Appendix D) and two other special-status species are unconfirmed as occurring in the GND

The two unconfirmed special-status species are southwestern willow flycatcher and Bell's sage sparrow. However, both willow flycatcher and sage sparrow occur in the GND but whether they are the subspecies that are of special status has not been confirmed.

CONFIRMED PASSERINE (Perching) BIRDS		**Relative Abundance**			**Seasonal Observations**	**Breeding Locale**
Scientific Name	**Common Name**	**Oso Flaco Lake**	**ODSVRA**	**GOF**		
Tyrannidae	**Tyrant Flycatchers**					
Conotopus sordidulus	Western wood pewee	Incidental	-	C (Su)	Su F	cen. Alaska to Central America
Conotopus cooperi	Olive-sided flycatcher	-	-	C (Su)	Sp Su F	Alaska, Canada, w. & ne. US
Empidonax difficilis	Pacific-slope flycatcher	U	R	C (Su)	Su F	se Alaska, w Can to Honduras
Empidonax hammondii	Hammond's flycatcher	-	-	U (M)	F	e-cen Alaska, w Can, w US
Empidonax minimus	Least flycatcher	--	--	R (M)	F	Canada, n. US, east of Rockies
Empidonax oberholseri	Dusky flycatcher	R	-	R (M)		w. Canada, w. US
Empidonax trailii	Willow flycatcher	-	-	R (Sp-F)	Sp Su F	Alaska, Canada to sw. and cen. US
Empidonax wrightii	Gray flycatcher	-	-	R (M)	Sp W	Western US
Myiarchus cinerascens	Ash-throated flycatcher	-	-	C (Su)	Su	**GND**, w. US to s Mexico
Myiarchus crinitus	Great crested flycatcher	-	-		F	S. Canada, e & cen US
Sayornis nigricans	Black phoebe	C	C	C (Su)	Sp Su F W	**GND**, sw. US to n. Argentina
Sayornis phoebe	Eastern phoebe	R	-	R (M)		e. of Rockies Canada to s. US
Sayornis saya	Say's phoebe	C	U	U (Res)	Sp Su W	w. North America
Tyrannus melancholicus	Tropical kingbird	Incidental	-	R (M)	F	s. Arizona to Argentina
Tyrannus verticalis	Western kingbird	Incidental	-	C (Su)	Su	sw. Canada to n. Mexico
Tyrannus vociferans	Cassin's kingbird	-	-	R (M)	F	w. US to s. Mexicao, Guatamala
Alaudidae	**Larks**					
Eremophila alpestris actia	California horned lark	-	-	C(Su)U(Res)	Sp Su F W	Widespread in N. Hemisphere
Hirundinidae	**Swallows**					
Hirundo rustica	Barn swallow	C	U	C (Su)	Sp Su W	Widespread in N. Hemisphere
Petrochelidon (Hirundo) pyrrhonota	Cliff swallow	C	C	C (Su)	Sp Su F	Alaska, Canada to Mexico
Progne subis	Purple martin	-	-	R (M)	Su	s. Canada to n. Mex, Gulf States
Riparia riparia	Bank swallow	-	-	U (Sp-F)	Sp Su F	Widespread in N. Hemisphere
Stelgidopteryx serripennis	N. rough winged swallow	Incidental	-	U (Su)	Su	s. Canada to Cosa Rica
Tachycineta bicolor	Tree swallow	C	-	C (M)	Sp Su F W	**GND**, AK, Can to CA, cen-e. US
Tachycineta thalassina	Violet-green swallow	C	-	C (Su, M)	Su	cen Alaska, w Can to Mexico
Corvidae	**Crows, Ravens, Jays**					
Aphelocoma coerulescens	Western Scrub jay	C	U	C (Res)	Sp Su F W	**GND**, Wash-CA to Colo & NMex
Corvus brachyrhynchos	American crow	U	U	C (Res)	Sp Su F W	Canada to s. US, n Baja CA
Corvus corax	Common raven	Incidental	-	U (Res)	Sp Su F W	N. America, Eurasia, Africa

Table 6.9 Confirmed and Unconfirmed Passerines

CONFIRMED PASSERINE BIRDS (continued)		Relative Abundance			Seasonal Observations				Breeding Locale
Scientific Name	Common Name	Oso Flaco Lake	ODSVRA	GOF					
Sittidae	**Nuthatches**								
Sitta canadensis	Red-breasted nuthatch	-	-	R (M)		Su	F		se Alaska, Canada, w & ne US
Sitta carolinensis	White-breasted nuthatch	-	-	R (M)		Su	F		s. Canada to s. Mexico
Sitta pygmaea	Pygmy nuthatch	-	-	R (M)		Su			s. British Columbia to cen Mexico
Certhiidae	**Creepers**								
Certhis americana	Brown creeper	-	-	U (W)	Sp	Su	F	W	s. Alaska, Canada to Nicaragua
Paridae	**Chickadees, Titmice**								
Baeolophus (Parus) inornatus	Oak (plain) titmouse	-	R	C (Res)	Sp	Su	F	W	w. US
Poecile (Parus) rufescens	Chestnut-backed chickadee	C	-	U (Res)	Sp	Su	F	W	w. North America
Aegithalidae	**Bushtit**								
Psaltriparus minimus	Bushtit	C	C	C (Res)	Sp	Su	F	W	**GND**, sw Brit Col to Guatamala
Troglodytidae	**Wrens**								
Cistothorus palustris	Marsh wren	C	Incidental	C (Res)	Sp	Su	F	W	**GND**, s. Canada to nw. Mexico
Thryomanes bewickii	Bewick's wren	C	C	C (Res)	Sp	Su	F	W	**GND**, s. Canada to Mexico
Troglodytes aedon	House wren	C	-	U(Res),C(Su)	Sp	Su	F	W	**GND**, s. Canada to Tierra del F
Troglodytes troglodytes	Winter wren	-	-	U (W)		Su	F	W	Northern parts of N. America
Regulidae	**Kinglets**								
Regulus calendula	Ruby-crowned kinglet	C	R	C (Res)		Su	F		Canada, Alaska, w. US
Regulus satrapa	Golden-crowned kinglet	-	-	R (W)			F	W	s. Alaska, Can. to Guatamala
Sylviidae	**Gnatcatchers**								
Polioptila caerulea	Blue-grey gnatcatcher	-	R	U (Res)		Su		W	s. Utah, s Ontario to Guatamala
Turdidae	**Thrushes**								
Catharus guttatus	Hermit thrush	C	U	C (Su)	Sp		F		Alaska, Canada, w. & ne US
Catharus ustulatus	Swainson's thrush	C	-	C (M)	Sp	Su	F	W	Alaska, Canada, w. & ne US
Sialia currucoides	Mountain bluebird	-	-	U (M)				W	Alaska, w Canada to sw US
Sialia mexicana	Western bluebird	-	-	U (Res)	Sp	Su	F	W	**GND**,s. Brit Col, w US-cen Mex mts
Turdus migratorius	American robin	C	-	U(Res)C(Su)	Sp	Su	F	W	Alaska, Canada to s. Mexico
Timaliidae	**Wrentit**								
Chamaea fasciata	Wrentit	C	C	C (Res)		Su	F		**GND**, Oregon to n. Baja CA
Mimidae	**Mimic Thrushes**								
Dumetella carolinensis	Gray catbird	-	-	R (M)	Sp				S. Canada, e & cen US
Mimus polyglottos	Northern Mockingbird	R	-	C (Res)	Sp	Su	F	W	**GND**, s Can - s Mex, W Indies, HI
Toxostoma redivivum	California thrasher	C	C	C (Res)	Sp	Su	F	W	**GND**, California, n Baja CA

Table 6.10 Confirmed and Unconfirmed Passerines (continued)

CONFIRMED PASSERINE BIRDS (continued)		Relative Abundance			Seasonal Observations				Breeding Locale
Scientific Name	**Common Name**	**Oso Flaco Lake**	**ODSVRA**	**GOF**					
Motacillidae	**Pipits**								
Anthus cervinus	Red-throated pipit	-	-	R (M)			F		Eurasia nw. Alaska
Anthus (spinoletta) rubescens	American (water) pipit	C	C	C (W)	Sp	Su	F	W	Colder parts of N. Hemisphere
Bombycillidae	**Waxwings**								
Bombycilla cedorum	Cedar waxwing	C	-	C (W)	Sp		F		se Alaska, Canada to s-cen US
Vireonidae	**Vireos**								
Vireo bellii pusillus	Least bell's vireo	-	-	R (M)					cen. & sw US, n. Mexico
Vireo flavoviridis	Yellow green vireo	-	-	R (M)			F		Rio Grande delta, n Mex-Panama
Vireo gilvus	Warbling vireo	-	-	R (M)	Sp	Su	F		Canada to s. US, cen Mexico
Vireo huttoni	Hutton's vireo	Incidental	-	R (M)		Su	F		**GND**, sw Brit Col to Guatamala
Vireo solitrius	Blue-headed (solitary) vireo	-	-	R (M)			F		Canada to El Salvidor
Laniidae	**Shrikes**								
Lanius ludovicianus	Loggerhead shrike	C	C	C (Res)	Sp	Su	F	W	**GND**, s. Canada to s. Mexico
Sturnidae	**Starlings**								
Sturnus vulgaris	European starling	-	R	C (Res)	Sp	Su	F	W	**GND**, Eurasia, Afr, intro N. Am
Parulidae	**Wood Warblers**								
Dendroica coronata	Yellow-rumped warbler	C	C	C (W)	Sp	Su	F		Alaska, Can.,w. US - Guatamala
Dendroica fusca	Blackburnian warbler	-	-	R (M)			F		Canada, e. US
Dendroica magnolia	Magnoila warbler	-	-	R (M)	Sp		F		Canada, e. US
Dendroica nigrescens	Black-throated grey warbler	Incidental	-	C (SU, M)	Sp	Su	F		western N. America
Dendroica occidentalis	Hermit warbler	R	-	C (M)	Sp	Su	F	W	Pacific states
Dendroica pensylvanica	Chestnut-sided warbler	-	-	R (M)		Su	F		s. Canada, ne. US
Dendroica petechia	Yellow warbler	C	U	C (M)	Sp	Su	F		**GND**, Alaska, Canada to Peru
Dendroica pinus	Pine warbler	-	-	R (M)			F		e. North America, W. Indies
Dendroica striata	Blackpoll warbler	-	-	R (M)		Su	F		Alaska, Canada, ne US
Dendroica townsendi	Townsend's warbler	C	R	U (W), C(M)	Sp	Su	F		nw. N. America
Dendroica virens	Black-throated green warbler	-	-	R (M)			F		Canada, ne US & south to GA
Geothlypis trichas	Common yellowthroat	C	C	C (Res)		Su	F	W	**GND**, Canada to s. Mexico
Icteria virens	Yellow-breasted chat	-	-	U (Su)	Sp	Su			s. Canada to cen. Mexico
Mniotilta varia	Black and white warbler	-	-	R (M)		Su	F	W	Canada to Gulf States
Oporonis agilis	Connecticut warbler	-	-	R (M)			F		cen.-s. Canada, cen.-n. US
Oporonis tolmiei	MacGillivray's warbler	-	R	C (M)		Su	F		w. North America
Parula americana	Northern parula	-	-	R (M)		Su	F		sw. Canada, e. US
Phylloscopus borealis	Artic warbler	-	-	R (M)			F		near tree limit n. Eurasia, Alaska
Seiurus aurocapillus	Ovenbird	-	-	R (M)			F		s. Canada, US east of Rockies
Seiurus noveboracensis	Northern waterthrush	-	-	R (M)		Su		W	Alaska, Canada, n. edge US

Table 6.10 Confirmed and Unconfirmed Passerines (continued)

CONFIRMED PASSERINE BIRDS (continued)		**Relative Abundance**			**Seasonal Observations**				**Breeding Locale**
Scientific Name	**Common Name**	**Oso Flaco Lake**	**ODSVRA**	**GOF**					
Parulidae (continued)	**Wood Warblers**								
Setophaga ruticilla	American redstart	-	-	U (M)		Su	F	W	Canada, e. US
Vermivora celata	Orange-crowned warbler	C	-	C (Res)	Sp	Su	F		**GND**, Alaska, Canada, w. US
Vermivora peregrina	Tennessee warbler	-	-	R (W)		Su		W	Canada, ne. edge of US
Vermivora ruficapilla	Nashville warbler	-	-	U (W)			F		s. Canada, w. and s. US
Wilsonia canadensis	Canada warbler	-	-	R (M)			F		Canada, e. US
Wilsonia pusilla	Wilson's warbler	C	R	C(Su), U (W)	Sp	Su	F	W	**GND**, Alaska, Can. W. & ne. US
Icteridae	**Blackbirds, Orioles**								
Agelaius phoeniceus	Red-winged blackbird	C	-	C (Res)	Sp	Su	F		**GND**, Can. - W. Indies, C. Rica
Agelaius tricolor	Tri-color blackbird	C	-	C (Res)	Sp	Su	F		**GND**, s. Oregon to nw Baja CA
Euphagus cyanocephalus	Brewer's blackbird	C	C	C (Res)	Sp	Su	F	W	sw. Canada, w US to s. Mexico
Icterus bullockii	Bullock's oriole	-	-	U (Su)	Sp	Su	F	W	sw. Canada, w. US, n. Mexico
Icterus cucullatus	Hooded oriole	-	-	U (Su)	Sp	Su			sw. U to s. Mexico
Icterus spurius	Orchard Oriole	-	-	R	Sp				se. Can & cen. US to cen. Mexico
Molothrus ater	Brown-headed cowbird	C	-	C (Res)	Sp	Su	F	W	s. Canada to Mexico
Quiscalus mexicanus	Great-tailed grackle	-	-	R (M)	Sp		F	W	**GND**, sw. US to Peru
Sturnella neglecta	Western meadowlark	C	R	C (Res)	Sp	Su	F	W	**GND**, sw Can., w. US - Mexico
Xanthocephalus xanthocephalus	Yellow-headed blackbird	-	-		Sp		F		s. Canada, w US - nw Mexico
Thraupidae	**Tanagers**								
Piranga ludoviciana	Western tanager	U	-	C (SU, M)	Sp	Su	F		w. North America
Piranga olivacea	Scarlet tanager	-	-	R (M)	Sp		F		se. Can., e. US (E of 100th Merid)
Piranga rubra	Summer tanager	-	-	R (M)		Su	F		cen. & s. US to n. Mexico
Emberizidae	**Sparrows, Towhees, Juncos**								
Amphispiza belli	Sage sparrow	-	-	R (M)	Sp		F	W	**GND**, w. US to n. Mexico
Calcarius lapponicus	Lapland longspur	-	-	R (M)			F		Arctic, circumpolar
Chondestes grammacus	Lark sparrow	-	-	U		Su			s. Canada to n. Mexico
Junco hyemalis aikeni	Dark-eyed junco	-	-	U (Res)	Sp	Su	F	W	**GND**, AK, Can. to se US
Melospiza georgiana	Swamp sparrow	-	-	R (M)	Sp		F	W	Canada e.of Rockies, ne. US
Melospiza lincolnii	Lincoln's sparrow	-	-	U (W)			F	W	Alaska, Canada, w. & ne. US
Melospiza melodia	Song sparrow	C	C	C (Res)	Sp	Su	F	W	**GND**, AK, Can.-cen. Mexico
Passer domesticus	House sparrow	-	-	C (Res)	Sp	Su	F	W	**GND**, everywhere
Passerella iliaca	Fox sparrow	U	-	U (S)		Su	F		Alaska, Canada, cen.-w. US
Passerculus sandwichensis	Savannah sparrow	-	-	C (S, Res)	Sp	Su	F	W	**GND**, Alaska, Can. to Guatamala
Pipilo crissalis	California (Brown) towhee	U	C	C (Res)	Sp	Su	F	W	**GND**, sw Oregon to Baja CA
Pipilo maculatus	Spotted towhee	C	C	C (Res)	Sp	Su	F	W	**GND**, s. Canada to Guatamala
Spizella pallida	Clay-colored sparrow	-	-	R(M)			F		w. & cen. Canada, n-cen. US
Spizella passerina	Chipping sparrow	-	-	U (W)	Sp	Su	F	W	Canada to Nicaragua
Zonotrichia albicollis	White-throated sparrow	-	-	U (M)			F		Canada, ne. US
Zonotrichia atricapilla	Golden-crowned sparrow	C	R	C (W)		Su	F	W	nw. North America
Zonotrichia leucophrys	White-crowned sparrow	C	C	C (Res)	Sp	Su	F	W	**GND**, Alaska, Canada, w. US

Table 6.10 Confirmed and Unconfirmed Passerines (continued)

CONFIRMED PASSERINE BIRDS (continued)		Relative Abundance			Seasonal Observations				Breeding Locale
Scientific Name	Common Name	Oso Flaco Lake	ODSVRA	GOF					
Cardinalidae	**Grosbeaks, Buntings**								
Passerina ciris	Painted bunting	-	-	R(M)		Su			s. US, ne. Mexico
Pheucticus ludovicianus	Rose-breasted grosbeak	-	-	R(M)		Su			s. Canada, e. & cen. US
Pheucticus melanocephalus	Black-headed grosbeak	-	-	C (Su)	Sp	Su			s. Canada, w. US to s. Mexico
Fringillidae	**Finches**								
Carpodacus mexicanus	House finch	C	C	C (Res)	Sp	Su	F	W	Br. Columbia to s. Mexico
Carpodacus purpureus	Purple finch	C	-	U (Su)		Su			Can., w. US, n. Baja CA, ne. US
Carduelis (Spinus) pinus	Pine siskin	-	-	U (W)			F	W	s. Canada to s. US
Carduelis (Spinus) lawrencei	Lawrence's goldfinch	-	-	C (Res)	Sp	Su	F	W	n. California to n. Baja CA
Carduelis (Spinus) psaltria	Lesser goldfinch	R	C	C (Res)	Sp	Su	F	W	**GND**, w. US to Peru
Carduelis (Spinus) tristis	American goldfinch	C	R	C (Res)	Sp	Su	F	W	**GND**, s. Can.- s. US, n. Baja CA
Loxia curvirostra	Red crossbill	-	-	R (M)	Sp		F		Conifers in N. Hemisphere

Table 6.10 Confirmed and Unconfirmed Passerines (continued)

Local GND bird abundances

Among the 56 bird species observed by Burton and Kutilek (1991) at Oso Flaco Lake; 10 passerine taxa represented about 48% (16,768) of the total number of individual birds observed (Table 6.9-1).

Family	Common Name	Scientific Name	Number
Icteridae	Red-winged blackbird	*Agelaius phoeniceus*	2,548
Hirundinidae	Tree swallow	*Tachycineta bicolor*	1,948
Hirundinidae	Barn swallow	*Hirundo rustica*	1,931
Icteridae	Tri-color blackbird	*Agelaius tricolor*	1,757
Hirundinidae	Cliff swallow	*Petrochelidon pyrrhonota*	1,430
Emberizidae	Song sparrow	*Melospiza melodia*	980
Parulidae	Yellow-rumped warbler	*Dendroica coronata*	976
Icteridae	Brewer's blackbird	*Euphagus cyanocephalus*	894
Fringillidae	House finch	*Carpodacus mexicanus*	835
Timaliidae	Wrentit	*Chamaea fasciata*	619

Table 6.10-1 Ten most abundant passerine species observed at Oso Flaco Lake (Burton and Kutilek 1991).

Swallows (Hirundinidae, 5,309) and blackbirds (Icteridae, 5,199) were the most numerous bird families around the lake, accounting for nearly 30% of all the birds observed. The tall, bulrush lined lake margins are the preferred habitat for the blackbirds and the swallows that forage for insects over the surface of the lake.

Over a one year period, quantitative bird observations at the Oceano Dunes SVRA showed the number of passerines to be much lower (<1,800) than at Oso Flaco, representing less than 8% of the approximately 22,000 total number of individual birds enumerated (Kutilek et al 1991). No one or two families dominate the diversity of birds at the ODSVRA (Table 6.9.2).

Family	Common Name	Scientific Name	Number
Aegithalidae	Bushtit	*Psaltriparus minimus*	467
Fringillidae	House finch	*Carpodacus mexicanus*	295
Emberizidae	White-crowned sparrow	*Zonotrichia leucophyrs*	215
Timaliidae	Wrentit	*Chamaea fasciata*	166
Troglodytidae	Bewick's wren	*Thyomanes bewickii*	144
Parulidae	Yellow-rumped warbler	*Dendroica coronata*	131
Hirundinidae	Cliff swallow	*Petrochelidon pyrrhonota*	122
Icteridae	Brewer's blackbird	*Euphagus cyanocephalus*	97
Mimidae	California thrasher	*Toxostoma redivivum*	84
Emberizidae	Spotted towhee	*Pipilo maculatus*	68

Table 6.10-2 Ten most abundant passerine species observed at Oceano Dunes SVRA (Kutilek et al. 1991).

Although the two areas are not strictly comparable, the area open to recreational vehicles has less vegetated area and more disturbance than the Oso Flaco Lake area which may at least contribute to the lower diversity of passerine birds there (see however the section on gulls and terns for the dominant taxa in the ODSVRA area).

Passerines breeding in the GND

Thirty-three passerine species are reported to breed in the GND (Table 6.10-3). The majority are sparrows (Emberizidae, 8 species), blackbirds (Icteridae, 4 species) and warblers (Parulidae, 4 species).

Family	Common Name	Scientific Name	Breeding Habitat
Aegithalidae	Bushtit	*Psaltriparus minimus*	Riparian or woodland
Corvidae	Western Scrub jay	*Aphelocoma coerulescens*	Riparian or woodland
Emberizidae	Sage sparrow	Amphispiza belli	Pt. Sal (CDS 1980s), Possibly BLC
	Dark-eyed junco	*Junco hyemalis aikeni*	Willows, oaks, eucalyptus
	Song sparrow	*Melospiza melodia*	Riparian, Freshwater Marsh
	House sparrow	*Passer domesticus*	Human habitation
	Savannah sparrow	*Passerculus*	Foredune, salt marshes or in dune
	California (Brown) towhee	*Pipilo crissalis*	Low ground successional-scrub
	Spotted towhee	*P. maculatus*	On ground, thick brush (CDS or
	White-crowned sparrow	*Zonotrichia leucophrys*	Riparian berry brambles
Fringillidae	Lesser goldfinch	*Carduelis psaltria*	Deciduous shrub or tree
	American goldfinch	*C. tristis*	Riparian with weedy brush
Hirundinidae	Tree swallow	*Tachycineta bicolor*	Tall willow & cottonwood, SMR
Icteridae	Red-winged blackbird	*Agelaius phoeniceus*	Marsh tule, cattails or willows
	Tri-color blackbird	*A. tricolor*	Marsh tule or cattails
	Great-tailed grackle	*Quiscalus mexicanus*	Above water, in a tree, shrub

	Western meadowlark	*Sturnella neglecta*	On ground among grasses & forbs
Laniidae	Loggerhead shrike	*Lanius ludovicianus*	Densely-foliaged shrub or tree
Mimidae	Northern Mockingbird	*Mimus polyglottos*	Shrub, small tree, or vines
	California thrasher	*Toxostoma redivivum*	Large shrub or scrubby tree
Parulidae	Yellow warbler	*Dendroica petechia*	Riparian
	Common yellowthroat	*Geothlypis trichas*	Within 8 cm (3 in) of ground. May be over water, in emergent aquatic vegetation, dense shrubs
	Orange-crowned warbler	*Vermivora celata*	Brushy cover on ground, or in shrub <
	Wilson's warbler	*Wilsonia pusilla*	SM River, on ground under dense
Sturnidae	European starling	*Sturnus vulgaris*	Tree cavity, brood parasite
Timaliidae	Wrentit	*Chamaea fasciata*	Concealed in a dense shrubs
Troglodytidae	Marsh wren	*Cistothorus palustris*	Wetland cattail, bulrush, or sedge
	Bewick's wren	*Thryomanes bewickii*	Riparian
	House wren	*Troglodytes aedon*	Trees, woodpecker hole
Turdidae	Western bluebird	*Sialia mexicana*	Woodpecker hole or Cliff swallow nest
Tyrannidae	Ash-throated flycatcher	*Myiarchus cinerascens*	Trees, woodpecker hole
	Black phoebe	*Sayornis nigricans*	Nest built of mud & plant matter near or over water on cliff face or man-made
Vireonidae	Hutton's vireo	*Vireo huttoni*	Oak woodland

Table 6.10-3 Breeding passerine birds reported for the Guadalupe Nipomo Dunes.

Of some concern is the brood parasitism by introduced European starlings. European starling probably arrived in Santa Barbara County in 1957 and have had a dramatic negative effect on cavity-nesting species (Lehman 1994). Notable declines in acorn woodpecker, purple martin and western bluebird populations have been attributed to competition with starlings for nest sites. Starlings also harass other cavity nesters including downy woodpeckers and tree swallows (Lehman 1994).

<u>Special status passerine species breeding in GND</u>

Several passerine special-status species and several more passerines considered uncommon or rare find favorable conditions for breeding in GND (Table 6.10-3, above), another indication of the great value of the habitats of the GND for sensitive wildlife species.

A brief summary of the information regarding the breeding of these species is presented.

Marantz (1986 pp. 165-66) reports that in SLO County, sage sparrow **(***Amphispiza belli*) was found only at Black Lake Canyon (BLC) on 5 May 1982. Due to the sedentary habits of this species, its presence in BLC implies possible breeding. Lehman (1996, p. 271) concluded singing individuals in coastal sage scrub at Point Sal in May 1981 and 1989 and June 1990 were undoubtedly breeding locally and were of the coastal subspecies*, Amphispiza belli belli* (Bell's sage sparrow), the subspecies listed by CDF&G as a bird Species of Special Concern. Since these reports of the 1980’s and early 1990's, only Unocal (1999-2004; J. Schneider, written communication) has observed sage sparrows in GND habitats, but without subspecies confirmation.

The other breeding sparrows are reported to nest mainly in riparian habitat. Exceptions to this generalization are the coastal populations of savannah sparrow (*Passerculus sandwichensis*) live in salt marshes or in dune grasses. These sparrows breed in areas where pickleweed, *Allenrolfea*, *Suaeda*, *Atriplex*, and saltgrass are dominant. Nests are usually constructed on the ground, usually hidden by a canopy or having a tunnel entrance (Moore 2000).

Dames & Moore (1979) report Belding's savannah sparrow (*P. s. beldingi*) in the GND. In California, this endangered subspecies population is not known to occur north of Goleta Slough, Santa Barbara County. As far as is known, no subsequent reports or observations support Belding's savannah sparrow occurrence in the GND (Moore 2000). Moore (2000) indicates that elsewhere in the state savannah sparrows exist in moderate numbers and within their historical range.

The common, ubiquitous house sparrow (*Passer domesticus*) is also well-represented nesters in and around man-made structures in the GND. This introduced species is also, curiously, one of the only birds that may feed on non-native grasses (Figure 1).

Figure 1. House sparrow feeding on seeds of non-native Veldt grass.
Photo courtesy Linda Tanner

Multitudes of tri-color blackbird (*Agelaius tricolor*) reproduce in marsh and emergent vegetation around Oso Flaco Lake (Kutilek 1991; T. Edell written communication). This species is a special-status species because of diminishing breeding habitat. Tri-color blackbird breeds near fresh water, preferably in emergent wetland with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, tall herbs all of which grow in or near Oso Flaco Lake.

In the 1980s, Marantz (1986 pg 172) noted great-tail grackle (*Quiscalus mexicanus*) as an accidental vagrant in San Luis Obispo County, but with no records in the GND. He predicted, however, it would rapidly expand its range and expected it to be recorded more regularly in the future. Although still rare today, it has been recently reported at Unocal GOF (W. Wehtje Unocal Consulting Biologist personal communication 24 December 2005) and annually by MCAS members (T. Edell, written communication) at places such as the Oceano Lagoon (MCAS 2005) with a population breeding at Oceano County Park in 2000 and the 22nd St horse ranch in September 2004 (M. Smith, MCAS, written communication).

Loggerhead shrike **(***Lanius ludovicianus*) is special-status because of loss of breeding habitat. Kutilek et al (1991) stated they commonly saw loggerhead shrike during summer around Oso Flaco Lake. The thick riparian habitat close to the Lake provides dense foliage protection for nest sites. Loggerhead shrike was consistently reported in all reports consulted for this study and observed by Morro Coast Audubon Society birders, as well.

California thrasher (*Toxostoma redivivum*) is of special-status due to habitat alteration. Better known from coastal chaparral habitats, California thrasher populations may be declining because of expanding development in these areas (Sibley, et al 2001). Peterson (1990) indicates thrasher find suitable habitat for breeding in large scrub habitat. Although exact breeding locations are not reported in the available local area literature, the birds presumably find appropriate nest locations in the riparian and denser coastal dune scrub habitat in the GND.

Yellow warbler (*Dendroica petechia*) is of special concern because of loss of breeding habitat and its susceptibility to nest parasitism by the brown-headed cowbird (Remsen 1978). Lehman (1994) states: "Yellow warbler breed in riparian woodland containing willows, cottonwoods, California bay, big-leaf maple, California sycamore or white alder. Wintering individuals are found in willow riparian and several ornamental plantings including blooming eucalyptus, *Myoporum laetum* and *Pitosporum* spp [trees]."

Like California thrasher, there are no direct reports of breeding locations for yellow warbler in the GND but a reasonable assumption, based on habitat from associations elsewhere, is that the dense willow-riparian habitat in the dunes is the likely location for nesting (e.g. evidenced by MCAS reports of singing in the willows at the entrance kiosk to Rancho Guadalupe Dunes County Park on 19 August 2000 and 18 August 2001; 25 Yellow Warblers in eucalyptus plus up to 150 at Oceano campground, 7 September 2000, 13 August 2001, and 23 September 2002).

Wrentit (*Chamaea fasciata*) is of special-status due to habitat alteration. They were reported as numerous at both the Oso Flaco Lake (Burton and Kutilek 1991) and Ocean Dunes SVRA (Kutilek et al 1991) study sites. They are closely associated with coastal sage scrub and chaparral habitats (Marantz 1986). Although there are no direct observations of nest sites, the dense cover in riparian habitats around Oso Flaco Lake and on vegetated islands in the SVRA provide likely nesting territory. The most recent breeding report is "families of wrentits" at Oso Flaco Lake area on 2 July 2002 (C. Adroin, MCAS, written communication).

Passerine migrants

In addition to breeding passerine special-status species, a host of other interesting passerines are transient species using the GND as a stop-over between summer and winter ranges. Rare and uncommon passerines comprise 72 of the 128 total passerines confirmed to occur in the GND (Table 6.10-4). All vireos (5 of 5 Vireonidae species) and nuthatchs (3 of 3 Sittidae species), plus a high percentage of wood warbler (14 of 26 Parulidae species), tyrant flycatcher (8 of 16 Tyrannidae species), and bunting/grosbeak (2 of 3 Cardinalidae species) occur only rarely in the GND. These birds are rare because they stray or wander from the normal migration routes of the main populations of their species and are, therefore, accidental migrates, outside of their normal winter distribution.

Seldom seen species such as painted bunting (*Passerina ciris*), rose-breasted grosbeak (*Pheucticus ludovicianus*), purple martin, (*Progne subis*), and pygmy nuthatch (*Sitta pygmaea*) have been limited to infrequent summer occurrences. The rose-breasted grosbeak, with a thick beak adapted for cracking tough seeds, and purple martin, a tree cavity breeder, are more common in oak woodland and therefore less likely to be encountered in dune surveys and casual observations.

	Relative Abundance		
Passerine Family	**Common**	**Uncommon**	**Rare**
Aegithalidae - Bushtit	1		
Alaudidae - Lark	1		
Bombycillidae - Waxwing	1		
Cardinalidae – Bunting, Grosbeak	1		Painted bunting Rose-breasted grosbeak
Certhiidae – Brown creeper		Brown creeper	
Corvidae – Crow, raven, jay	2	Common raven	
Emberizidae – Sparrow	8	Lark sparrow Dark-eyed junco Lincoln's sparrow Song sparrow	Lapland longspur Sage sparrow Swamp sparrow
Fringillidae - Finch	4	Purple finch Pine siskin	Red crossbill
Hirundinidae - Swallows	4	Bank swallow N. rough-winged swallow	Purple martin
Icteridae - Blackbird, Oriole	5	Bullock's oriole Hooded oriole Orchard oriole	Orchard oriole Brown-headed cowbird
Laniidae - Shrike	1		
Mimidae - Mimic Thrush	2	0	Gray catbird
Motacillidae - Pipit		0	Red-throated pipit
Paridae - Chickadees, Titmice		Chestnut backed chickadee	
Parulidae – Wood warbler	9	Yellow-breasted chat Black and white Connecticut warbler	Blackburnian warbler Magnoila warbler Black-throated grey warbler Hermit warbler
			Chestnut-sided warbler Pine warbler Blackpoll warbler Townsend's warbler Black-throated green

			Common yellowthroat warbler Yellow-breasted chat Black and white warbler Connecticut warbler Northern parula
			Artic warbler Ovenbird Northern waterthrush Canada warbler Lucy’s warbler Prothonotary warbler
Regulidae - Kinglet	1		Golden-crowned kinglet
Sittidae - Nuthatches			Red-breasted nuthatch White-breasted nuthatch Pygmy nuthatch
Sturnidae - Starling	1		
Sylviidae - Gnatcatcher		Blue-grey gnatcatcher	
Thraupidae - Tanagers	1		Scarlet tanager Summer tanager
Timaliidae - Wrentit	1	0	
Troglodytidae - Wren	3	Winter wren	
Turdidae - Thrush	2	Western bluebird Mountain bluebird American robin	
Tyrannidae - Flycatcher	6	Hammond's Say’s phoebe	Least Dusky Willow Gray Ash-throated
			Great crested Black phoebe Eastern phoebe
Vireonidae - Vireo			Least bell's Yellow green Warbling
			Hutton's Blue-headed (solitary)
Total Number of Species	**54**	**24**	**50**

Table 6.10-4 Relative abundance (common, uncommon or rare) of confirmed passerine species in the GND. The values are the number of species in each family that occur commonly. Common name included for uncommon and rare species (after Dames & Moore 1979).

<u>Passerines in coastal habitats</u>

As might be expected, few passerines have been observed in beach dune strand (17 species) or active sand (5 species) habitat (Table 6.10-5), because environmental conditions are more severe (wind, fog, exposure) and there is little structure for cover or perching. Among the most successful bird in this area are California horned lark, a special-status species (Table 6.1). More numerous species are the various swallows that fly over the mostly bare sand sections of the dunes. All swallow species except bank swallows (barn, cliff, northern rough-winged, tree, violet-green swallows and purple martin) are reported from these foredune areas. The open habitat provides good foraging areas with sometimes abundant insects such as kelp flies. Some birds may fly over the beach strand on their way to other areas such as open-water habitat, important swallow foraging areas in addition to providing mud for nest building.

Beach Strand (17)	Active Sand (5)	Estuarine (22)	Foredune (45)	Dune Swale (52) & CDS (79)
--	--	Least + great crest flycatcher	4 Flycatchers spp.	5 Flycatchers spp
CA horned lark	CA horned lark	CA horned lark	CA horned lark	CA horned lark
6 of 7 swallow spp.	Tree, v-g swallow	6 of 7 swallow spp.	6 of 7 swallow spp.	6 of 7 swallow spp.
Am. crow & Raven	--	Am. crow & Raven	Am. crow, Raven, Scrub jay	--
--	--	Marsh wren	Bewick's, House wren	Bewick's, House wren
--	--	--	Blue-gray gnatcatcher	B-g gnatcatcher
--	--	Swainson's thrush	Hermit thrush	Am. Robin, Western Bluebird, Mockingbird
--	--	--	Wrentit	Wrentit
--	--	--	California thrasher	California thrasher
--	--	--	Cedar waxwing	Cedar waxwing
Loggerhead shrike	Loggerhead shrike	--	Loggerhead shrike	Loggerhead shrike
European starling	--	European starling	European starling	European starling
--	--	--	--	Yellow rumped warbler + 12 spp. in CDS
Blk, Say's phoebe	--	Say's phoebe	Black, Say's phoebe	Black, Say's phoebe
American pipit	--	Am. & red-throated pipits	--	--
Brewer's blackbird	--	Brewer's & Red wing BB	Red wing, Brewer's BB, Brown-headed cowbird, Meadowlark	3 BB + Bullock's Oriole
White Crown sparrow	--	--	10 of 16 sparrows	Sage, Lark, Lincoln's, Wh. Throated sparrow
House finch	House finch	--	House finch + 3 goldfinch spp.	H. finch + 3 goldfinch

Table 6.10-5 Passerine birds reported to occur in the beach-dune strand, active sand, estuarine, foredune, dune swale and coastal dune scrub habitats in the GND. Number of taxa in parentheses.

<u>Potential effects of invasive plant species control methods to passerine birds</u>

As for most other birds in the GND, potential impacts to passerine birds would be expected to occur primarily from the use of herbicides and controlled burns to control the invasive plants. Controlled burns could reduce the numbers of insects such as grasshoppers, beetles, flies and leptidpterans potentially available as prey to the birds. Similarly, some ground foraging birds may ingest invertebrates inadvertently sprayed with herbicide and some birds may ingest seeds of the target invasive species, perhaps even those sprayed with herbicide. In the first instance, the area affected by controlled burns is essentially negligible when compared to the rest of the habitat unaffected by burns in the GND. In the second instance, the number of insects or seeds sprayed and then eaten by these birds would probably be fairly small and, in any case, the herbicides used in the GND are not expected to have a detrimental effect on birds since the enzyme pathway affected by the herbicide to kill plants does not exist in vertebrates. Invertebrates, primarily insects, are most affected by herbicides brought about by a change in the structure and composition of the plant community following application. In the GND the expected change in the vegetation in treated areas will be a reversion to native species that, in the long term, will be a benefit to the invertebrates and, in turn, to the native birds as well as other animals.

Literature cited

Ehrlich, P., D Dubkin, and D. Whey. 1988.

Lehman, P. 1994.

Marantz, C. 1986

Moore, L. 2000.

Sibley, J. et al. 2001

Passerine special-status species accounts

Species accounts are presented below for 18 special-status passerine bird species. One species is a Category 1 (very sensitive), 7 are Category 2 (sensitive) and 3 are Category 3 (of some concern). Species descriptions are provided for the federally endangered subspecies of two passerine species that have been recorded in the GND but for which no sub-species was identified. Bell's vireo (*Vireo bellii*) has been observed in the GND but was not identified as the federally endangered least Bell's vireo (*V. bellii pusillus*). Similarly, willow flycatcher (*Empidonax traillee*) were recorded in the GND but no subspecies was identified. The federally endangered subspecies is the southwestern willow flycatcher (*E. trailii extimus*).

Olive-sided flycatcher ***Contopus cooperi***

Status

Olive-sided flycatcher is a Category 3 special-status species (of some concern) due to serious population declines throughout much of its range, extirpations of some populations in limited geographic areas, and threats such as habitat loss on their wintering or breeding grounds, fire suppression and possibly pesticides (Alderfer 2006).

Habitat and occurrence within the GND

The olive-sided flycatcher is infrequently identified, and only reported from riparian habitat in the GND (Dames & Moore 1979; Unocal 1999-2004). Marantz (1986) describes this species as a locally fairly common transient and summer resident in the coastal zone. Spring transients arrive about mid-April with peak numbers in May –September. Most birds have departed by early September but one was observed at Arroyo Grande Creek Mouth on 21 September 1985 (Marantz 1986). They have been observed in all seasons except winter.

Habitat in other areas

Olive-sided flycatchers are generally only found in Morro Bay, at Cerro Alto, on the Nipomo Mesa and probably in Cambria (Marantz 1986). They generally require large trees for breeding. Olive-sided flycatcher breeds in montane and northern coniferous forests, at forest edges and openings, such as meadows and ponds from central Alaska across Canada and south through the mountain West to western Texas and Baja California. They winter at forest edges and clearings, where tall trees or snags are present, in Panama and northern South America (Cornell 2003h).

Present status within the GND

Recent observations in the Oceano Campground amphitheater by Morro Coast Audubon Society birders indicate that olive sided flycatchers continue to be observed in the GND during their spring and fall migrations (T. Edell, MCAS written communication).

Life history

The olive-sided flycatcher is frequently associated with burned forests. The opened area and the abundant snags may increase their success in catching flying insects. In breeding areas and on migration, olive sided flycatchers are almost invariably seen perched on high, conspicuous dead tree branches (Farrand 1983). They are specialists in aerial foraging for flying insects especially true flies and bees but will take virtually any flying insect (Sibley et al. 2001). They sally out from top of tall tree or snag to catch a flying insect, often returning to the same perch. After breeding and during migrations these flycatchers will eat some small berries (Sibley et al. 2001).

Potential effects of invasive plant species control methods

Olive sided flycatchers are not expected to be much affected, if at all, by current invasive weed control methods in the GND because they are: 1) found in riparian areas that are not targeted for invasive weed control measures and; 2) they hawk flying insects generally well above the ground and as such, the insects are very unlikely to have come into contact with herbicides applied to the target plant species.

Literature cited

Alderfer, J. 2006.

Altman, B., and R. Sallabanks. 2000.

Cornell. 2003h.

Farrand, J. 1983.

Sibley, J., et al. 2001.

California horned lark ***Eremophila alpestris actia***

Status

California horned lark are a Category 3 special-status species due to disturbance in their preferred nesting areas of grassy habitat within the state of California. Other populations of horned lark apparently do well on overgrazed or abused land and may have increased in North America over past 200 years (Kaufman 1996).

Habitat and occurrence within the GND

E. alpestris has been observed in beach - dune strand, estuarine, active sand, foredune, dune swale, coastal dune scrub and wetlands by numerous authors (Smith, et al 1976, Dames & Moore1979, Entrix Inc. 1996, Unocal 1999-2004). There were no observations of California horned lark by Burton and Kutilek (1991) and Kutilek et al. (1991) at either Oso Flaco Lake or the Oceano SVRA.

Habitat in other areas

California horned lark are common to abundant resident in a variety of open habitats, usually where trees and large shrubs are absent. The species prefers grasslands and other open habitats with low, sparse vegetation where rocks, litter, clods of soil, and other surface irregularities provide cover. Found along the coast and deserts near sea level to alpine dwarf-shrub habitat above tree line (Bent 1942, Green 2005). Flocks in desert lowlands in the winter.

Present status within the GND

Recent observations by Unocal (1999-2004) and Morro Coast Audubon Society birders indicate California horned lark are present year round in the GND (T. Edell, MCAS written communication).

Life history

California horned larks are yearlong residents within the state and within the GND habitats (Table 6.10; Appendix D). They eat insects, snails, and spiders during breeding season; foraging as it walks along ground, searching for food. Adds grass and forb seeds and other plant matter to its diet at other seasons (Bent 1942). Feeds on small seeds from a great variety of grasses and weeds (Kaufman 1996).

California horned lark breed from March through July, with peak activity in May. Their grass-lined nest is a cup-shaped depression on open ground. Although they are resident in the GND and present year round, they are not known to breed there. After breeding, they become very gregarious; often forming large flocks that forage and roost together. Migrants from outside of California join these wintering flocks, especially in the southeastern desert region of the state. Migrant status on the Farallon Islands indicates a latitudinal movement along the coast as well.

Potential effects of invasive plant species control methods

There appears to be some potential for California horned larks to occur in areas with both European beach grass and veldt grass. Whether or not they eat the seeds of these plants or not is not known. However, any seeds would have to be on the ground for them to be potentially eaten by horned larks. Any seeds treated with herbicide would likely take some time to fall off the stems, if they do at all following herbicide treatment. However, by that time the herbicide could be substantially biodegraded. Similar to any insects, or treated seeds, eaten by the larks would not be expected to be harmful to them because the metabolic pathway the herbicide affects in the plants is not present in birds or other vertebrates.

Literature cited

Bent, A. C. 1942.

Green, M. 2005.

Kaufman, K. 1996.

Purple martin *Progne subis*

Status

Purple martin are a Category 2 special-status species (sensitive). Their numbers have declined markedly in recent decades because of loss of riparian habitat, removal of snags, and competition for nest cavities from European starlings and house sparrows (Remsen 1978).

Habitat and occurrence within the GND

Purple martin have been observed only during summer in several GND habitats: beach - dune strand, estuarine, foredune, dune swale, central dune scrub, wetlands, riparian, oak woodland, eucalyptus forest by Smith et al. (1976) and Morro Coast Audubon Society (T. Edell, MCAS written communication).

<u>Habitat in other areas</u>

An uncommon to rare, local summer resident in a variety of wooded, low-elevation habitats throughout the state; a rare migrant in spring and fall, absent in winter (Green B338). Purple martin inhabit open forests, woodlands, and riparian areas in breeding season and a variety of open habitats during migration, including grassland, wet meadow, and fresh emergent wetland, usually near water. In SLO County they are more commonly found in woodland such as those areas in Atascadero (MCAS, written communication). Also occurs in coniferous habitats, including closed-cone pine-cypress, ponderosa pine, Douglas fir, and redwood (Green B338).

<u>Present status within the GND</u>

The few recent observations by Morro Coast Audubon Society birders indicate the species is rarely present in the GND, and then usually near Oso Flaco Lake (T. Edell, MCAS, written communication, 2005).

<u>Life history</u>

Purple martins (*Progne subis*) are the largest member of the swallow family in North America. Three subspecies are recognized: *Progne subis arboricola* breeds along the Pacific coast of the United States and is likely the subspecies present in the GND.

Purple martin, like all swallows, are aerial insectivores. Their diet includes dragonflies, damselflies, flies, midges, mayflies, stinkbugs, leafhoppers, Japanese beetles, June bugs, butterflies, moths, grasshoppers, cicadas, bees, wasps, flying ants, and ballooning spiders, usually caught in flight. Purple martins are daytime feeders and, feeding on the wing high in the sky, are extremely vulnerable to starvation during extended periods of cool and/or rainy weather (Sibley et al. 2001).

Purple martins spend the non-breeding season in Brazil then migrate to North America to nest. East of the Rockies they are totally dependent on human-supplied nesting structures. West of the Rockies and in the deserts they largely nest in abandoned woodpecker nest cavities. Although widespread throughout the US, their distribution in the western states is described as “peculiarly local” (Farrand 1983).

<u>Potential effects of invasive plant species control methods</u>

Purple martins are not expected to impacted, if at all, by current invasive weed control methods in the GND, because they hawk flying insects generally well above the ground. Insects inadvertently sprayed with herbicides, especially those with crop oil added as a surfactant, would likely not be able to fly or not fly well, as noted in an earlier section, as their wings would probably be wet and/or sticky.

<u>Literature cited</u>

Bent, A. C. 1942.

Farrand, J. 1983.

Green, M. B338 (2005).

Remsen, J. V., Jr. 1978.

Bank swallow ***Riparia riparia***

Status

The bank swallow is a Category 1 special-status species (very sensitive). It is listed by the CDF&G as threatened.

Historical information indicates this species mostly occurred as a localized breeder along coastal areas and rivers in Central and Southern California. These southern California populations have been extirpated due to habitat changes where rivers and streams have been channelized and coastal areas have been modified for human use (Garrison 1998). Nesting habitat is particularly threatened with loss by flood control and bank protection projects. A few Central California populations are extant.

There are few cases documenting management efforts taken specifically to benefit bank swallows. A recovery plan exists for bank swallows in California (Schlorff 1992). Experimental habitat modifications to improve breeding habitat were only temporarily successful (Garrison 1998).

Habitat and occurrence within the GND

Bank swallows are reported only over wetland habitats in the GND (Marantz 1986, pg 122) as a rare to very uncommon but regular spring and fall transient. Marantz (1986) referenced observations in spring (10 May 1982) and fall (Aug and to 3 Oct 1982) at Oso Flaco Lake; continues to be observed occasionally in the GND.

Habitat in other areas

As its scientific name, *Riparia riparia*, implies, bank swallows are largely found in riparian ecosystems, particularly rivers in the larger lowland valleys in California west of the deserts during the spring-fall period. They are less common on the coast (Green B338).

Throughout California, bank swallow colonies are mostly located in lowland vegetation habitats including riparian forests dominated by willows (*Salix* spp.) and Fremont cottonwood (*Populus fremontii*). Many central valley colonies occur in cultivated crops including deciduous orchards, irrigated row crops, and dryland grain crops. Colonies at coastal locations are located in and around coastal grassland and coastal scrub communities, while colonies in montane environments occur in coniferous forests.

Colonies in northeastern California occur near irrigated pasture, riparian forests, and desert shrub habitats. (Above from Green B338)

Present status within the GND

Few recent observations by Morro Coast Audubon Society birders indicate the species is rarely present in the GND, but usually near Oso Flaco Lake. Bank swallows observed 8-15 May 2004 were rare spring migrants with one to three birds present at Oso Flaco Lake and on 9 June 2004, two seen at OFL, were probably very late spring transients (MCAS written communication). The species has been noted during all seasons, however, except winter (Table 6.10).

Life history

Bank swallows have one of the widest ranges of any bird in the world with a breeding distribution that is largely Holarctic and a wintering distribution that is largely confined to the Southern Hemisphere (Garrison 1998).

The bank swallow forages during daylight hours predominantly on flying or jumping insects captured almost exclusively on the wing. Foraging habitats include aerial areas over lakes, ponds, rivers and streams, meadows, fields, pastures, bogs, and occasionally over forests and woodlands. Bank swallows occasionally take items from the surface of water and ground. Ground feeding occurs sporadically, and it appears to be related to large, localized concentrations of suitable insect prey on the ground. Vegetable matter is rarely eaten and appears to be accidental.

The bank swallow occurs as a breeding species in California in a hundred or so widely distributed nesting colonies, each supporting dozens to thousands of birds (Garrison 1998). Breeding habitat in California is extremely consistent with regard to the microsite. Nesting colonies only occur in vertical banks or bluffs of suitable soil at least 3 ft. in height to have some predator deterrence values. Present at almost all nesting sites is a continual source of erosion such as coastal bluff erosion or riverbank erosion that maintains the desired physical characteristics of the breeding area over time. Breeding habitat vegetation is extremely varied because breeding sites are selected primarily for the physical and edaphic suitability of the nesting bank.

Bank swallows are most affected by flooding and erosion disturbances that can have either positive negative effects to the colony. Disturbances such as fire, high winds, insect infestations of terrestrial vegetation, landslides, and earthquakes have little direct effect on bank swallows. They are relatively insensitive to moderate levels of human-induced disturbance. Colonies in California occur on river banks near actively farmed row crops and orchards and in coastal locations at public seashores with substantial human activity (Garrison 1998).

Potential effects of invasive plant species control methods

The potential effects of current invasive weed control measures to bank swallows is likely very minimal, if any exists at all, and essentially similar to that of the purple martin.

Pesticide use appears not to be a problem with bank swallows. Eggshell thinning has not been found, and a regional analysis of eggs found no detectable levels of any harmful pesticides (Garrison 1998).

Recent synonyms

Sand martin

Literature cited

Green, M. 2005 (B338).

Garrison, B. A. 1998.

Schlorff, R. W. 1992.

Oak titmouse *Baeolophus inornatus*

Status

Oak titmouse is a Category 3 special-status species due to population declines due to loss of its preferred oak woodland habitat from residential and agricultural development.

Much of the following information comes from the Audubon Society website (Audubon 2002-148).

A mixed blessing for the oak titmouse is that the sudden oak death fungal disease could increase availability of nesting cavities in the dead and infected trees and, in the short term, increase their population but, in the long run, the loss of the oaks will result in the loss of much habitat for the species.

California Partners in Flight (2002) recently created The Oak Woodland Bird Conservation Plan to guide land management policy and action for California's oak woodland habitats and its associated wildlife. The plan includes increasing the number of dead standing oaks in the oak titmouse's range. Live trees with dead limbs as well as diseased trees in which the heartwood decays are especially important to oak titmouse.

Habitat and occurrence within the GND

Oak titmouse has been found in near shore foredune, dune swale, central dune scrub habitats as well as riparian, oak woodland, and Eucalyptus forests (Smith et al. 1976, Kutilek, et al. 1991; Entrix Inc. 1996) and is reported from Black Lake Canyon (McClelland Engineers, Inc. 1988).

Habitat in other areas

The oak titmouse lives year-round in warm, dry, intact oak or oak-pine woodlands on the Pacific slope from southwest Oregon through California to northwestern Baja California, Mexico, where it breeds in low to middle elevations. Though they clearly prefer open oak and pine-oak woodlands, populations have adapted locally to warm, dry environments without oaks such as the western juniper woodland in northern California.

Present status within the GND

Few recent observations by Morro Coast Audubon Society birders indicate the species is occasionally reported in Oceano campground (4, 5 and 18 September 2000).

Life history

The oak titmouse has a distribution limited to mostly California and parts of southern Oregon and northern Baja California, Mexico. They are resident species and generally not migratory. They may, however, wander some distance outside of the normal range, perhaps in response to inclement weather or local shortages of prey. They nest in mostly natural cavities, sometimes in old woodpecker holes, in dead trees or dead branches on living trees. These snags are important to this species. It also uses artificial boxes.

All titmouse species are described as acrobatic feeders, moving through vegetation very actively, often hanging upside down from tip ends of stems, stalks and branches to capture prey or gather seeds. Their main diet is invertebrates including spiders, caterpillars and other insects, their eggs and larvae. During winter they may eat seeds, mostly from oaks. They usually hunt from an elevated perch to which they return to eat. They are known to cache seeds for long or short-term use.

Potential effects of invasive plant species control methods

Given that oak titmouse are found in a wide variety of GND habitats and that they are adaptable foragers, they may come into contact with targeted plant species treated by herbicides such as European beach grass in the foredunes and perhaps veldt grass in the dune scrub habitat. While it is not known if they in fact forage seeds from these grasses, they may forage insects from the dense vegetation provided by European beach grass. Any insects that may have come into contact with herbicides used on these plants and ingested by oak titmouse would not be expected to be toxic to the birds for reasons explained earlier.

Recent synonyms

Plain titmouse, *Parus inornatus*

Literature cited

Audubon Society. 2002-148.

California Partners in Flight. 2002.

Wrentit *Chamaea fasciata*

Status

The wrentit is Category 3 special-status species (of some concern), facing population declines due to habitat destruction. Local populations of wrentits disappear or decline in numbers with increasing pressures from suburbanization. They nest close to the ground and feral cats, associated with housing developments, are a growing threat to this species. Evidence suggests that developed areas can support wrentits if sufficient habitat is set aside for nesting pairs and their offspring. Other concerns are overgrazing, off-road vehicles, and fire.

Habitat and occurrence within the GND

Wrentits are reported to occur in summer and fall in foredune, dune swale, coastal dune scrub, and riparian habitats (all core authors). Large numbers of wrentits were reported by from Oso Flaco Lake (Table 6.10.1) and Oceano Dunes SVRA (Table 6.10.2) and are reported to breed in the GND (Table 6.10.3). Wrentit are also reported from Black Lake Canyon (McClelland Engineers 1988).

Much of the following information comes from the National Audubon Society website (Audubon 2002-223).

Habitat in other areas

Wrentits live in dense thickets along the Pacific coast from Oregon through California to northern Baja California. California populations may be found in more varied habitat types than the northern birds, but always in low, dense cover. Most common in chaparral thickets of poison oak, and coastal sage scrub, streamside thickets (Kaufman 1996). Also occur in shrubby areas in suburbs and city parks; hey have been observed using rural residential and agricultural areas (Kaufman 1996).

Present status within Guadalupe-Nipomo Dunes

Wrentit breed in the GND (Table 6.10.3). Morro Coast Audubon Society birders report adult and fledgling wrentits. These observations indicate the species is reproducing and commonly occurring in riparian habitat near Oso Flaco Lake (2 July 2002).

Life history

Wrentit are this hemisphere's only representative of the Babbler Family (Timaliidae) which is otherwise found in Europe, Africa, Asia, and Australia. They are very secretive and difficult to observe in their preferred habitat of dense shrubbery. They are, however, very vocal and are more often heard than seen.

While wrentit diet consists mostly of insects in spring and summer, they will take berries during shortages of insects and in winter. Prey includes small wasps, caterpillars, beetles, scale insects, leafhoppers, plus spicers (Kaufman 1996). Young are apparently fed insects exclusively. They will come to bird feeding stations for berries, breadcrumbs, and mealworms and other soft items and may take sugar-water from hummingbird feeders (Kaufman 1996).

The species preferred habitat is chaparral brush and coastal brushy thickets. They may also use streamside brushy edges of parks and some suburban settings. They can also inhabit areas around human habitation and agriculture if sufficient areas of undisturbed chaparral or other dense brushlands are available nearby. A pair will remain together in a suitable site, even as small as one acre (Kaufman 1996).

Potential effects of invasive plant species control methods

Potential impacts, if any, to wrentit by the current invasive plant species control methods in the GND are likely to be minimal, essentially the same as for the oak titmouse, because their preferred habitat does not include grasslands (or iceplant dominated areas), a primary target for weed control in the GND.

Literature cited

Kaufman, K. 1996.

National Audubon Society. 2002-223.

California thrasher *Toxostoma redivivum*

Much of the following information comes from the National Audubon Society website (Audubon 2002-060).

Status

The California thrasher is a Category 3 special-status species (of some concern), facing population declines. California thrashers are an endemic species of the California Biotic Province (mostly in the western part of the state). In good habitat, they flourish, but when habitat becomes degraded or fragmented, their numbers decline. Declining California thrasher counts are consistent with losses in California quail, wrentits and other birds reliant on dense stands of chaparral, according to the San Francisco Bay

Bird Observatory [see http://www.sfbbo.org/miscpops.htm]. The species does not adapt well to habitat fragmentation and modification and will leave disturbed areas even when remnant habitat patches remain. A smaller threat is the use of pesticides on citrus crops where the thrasher sometimes feeds.

Habitat and occurrence within the GND

California thrashers occur year round in foredune, dune swale, coastal dune scrub, wetland and riparian habitats (by all core authors), and in Black Lake Canyon (McClelland Engineers 1988). Moderate numbers of *Toxostoma redivivum* were reported by Burton and Kutilek (1991) and Kutilek et al (1991) at Oso Flaco Lake (Table 6.10.1) and Oceano Dunes SVRD (Table 6.10.2), and are reported to breed in the GND (Table 6.10.3).

Habitat in other areas

The California thrasher is endemic to the coastal and foothills regions of California and is considered highly specialized for dense chaparral habitat (Sibley et al. 2001). Vegetation is the most important factor influencing the distribution of this species. They are most concentrated in chaparral that is open, close to the ground with strongly interlaced branches and an evergreen, closed canopy (Root 1988).

Present status within Guadalupe-Nipomo Dunes

Observations of adult and fledgling California thrashers are commonly reported by Morro Coast Audubon Society birders and indicate the species is reproducing and commonly occur in willow riparian habitat near Oso Flaco Lake (11 April 2001, 12 May 2002).

Life history

A non-migratory, resident bird in dense chaparral or other dense vegetation. Its dispersal is very limited. They rarely fly and when they do it is only for short distances (Root 1988). Foraging activity is almost entirely on the ground, using their bill to probe the soil and duff for larger insects such as Jerusalem crickets (Sibley et al. 2001) caterpillars, cocoons, beetles, moths and spiders (Root 1988), which they eat year round. In some areas and during some seasons, California thrashers will take berries of whatever type is available (Sibley et al. 2001). They rarely forage outside of dense cover, but may forage for berries and fruit from orchards. Will use bird feeders (Kaufman 1996).

California thrashers breed in thick chaparral, but will breed in adjacent oak woodlands and pine-juniper scrub, as well as occasionally in parks and gardens, but only if dense cover is available (Kaufman 1996). They form pairs in winter and the female usually lays her clutch in February or March in the nest in dense vegetation. Hatchlings are fed by regurgitation for the first four days after which they are fed large insects with legs and wings removed.

Potential effects of invasive plant species control methods

Potential effects to California thrashers from current invasive plant control methods in the GND can be expected to be very minimal if at all because the dense chaparral, riparian and coastal sage scrub vegetation they prefer are not treated. Veldt grass is generally treated in more open areas, away from thick stands of native vegetation. While the thrashers do occur in the foredunes, the type of structure provided by European beach grass is not the gnarled, layered, dense vegetation structure they prefer.

Literature cited

Audubon Society. 2002-060.

Kaufman, K. 1996.

Root, T. 1988.

Loggerhead shrike ***Lanius ludovicianus***

Status

Loggerhead shrike, *Lanius ludovicianus*, is a Category 2 special-status species (sensitive). Although populations have declined elsewhere, they have remained fairly stable in the Pacific states (Granholm B410).

Reasons for the decline of loggerhead shrikes across North America, particularly in the northeast, are not well understood. In many areas conversion from pasture land to cropland was directly related to the decline in loggerheads (Telfer 1992). Habitat depletion also affects the daily habits of loggerhead shrikes. Loggerhead shrikes spend 80 percent of their days sitting, but shrikes that live in suboptimal habitats spend excessive amounts of time foraging (Western Riverside County Multiple Species Habitat Conservation Plan 1999).

Habitat and Occurrence within Guadalupe-Nipomo dunes

Loggerhead shrike are reported year round by all core authors in active sand, foredune, dune swale, central dune scrub, wetlands and riparian habitats. They are reported to breed in the dunes (Table 6.10.3; Dames & Moore 1979). Kutilek et al (1991) commonly observed loggerhead shrike during summer around Oso Flaco Lake. The thick riparian habitat close to the Lake provides dense foliage protection for nest sites. Loggerhead shrike was consistently observed by Morro Coast Audubon Society birders, as well.

Habitat in other areas

A common resident and winter visitor in lowlands and foothills throughout California. Loggerhead shrikes prefer open habitats with scattered shrubs, trees, posts, fences, and utility lines, for perches. Highest density occurs in open-canopied valley foothill hardwood, valley foothill hardwood-conifer, valley foothill riparian, pinyon-juniper, juniper, desert riparian, and Joshua tree habitats. They are rarely observed in heavily urbanized areas, but often found in open cropland (Granholm B410).

Present status within the GND

Loggerhead shrikes remain commonly observed in recent Unocal monitoring efforts in the GOF (Unocal 1999-2004) and by Morro Coast Audubon Society birders (T. Edell written communication).

Life history

Loggerhead shrikes are a common, resident species throughout the lower one-half of the U.S. (Kaufman 1996). Their breeding areas extend north into Canada. In California, the loggerhead lays eggs from March into May and the young become independent in July or August.

Loggerhead shrikes eat mostly large insects (e.g., beetles, grasshoppers); also takes small birds, mammals, amphibians, reptiles, fish, carrion, and various other invertebrates such as spiders, snails, and crayfish (Kaufman 1996). The species usually flies directly to the prey item either on the ground or in a shrub; but will often hover. They sometimes hawk aerial insects. Frequently it skewers prey on thorn, sharp twig, wire barb, or forces it into a branch crotch, to feed on or to cache for later feeding, a habit that gives loggerhead shrike their other common name of butcher bird.

Potential effects of invasive plant species control methods

There may be some potential for loggerhead shrikes to consume larger insects that may have come into contact with herbicides used to control invasive plants in the GND. Although loggerhead shrikes are observed most often in riparian areas such as Oso Flaco Lake, areas usually only lightly treated for invasive weeds, they do feed in more open areas such as coastal dune scrub where veldt grass may have been treated with herbicide. Their habit of careful observation of the habitat from a prominent perch may increase the likelihood that they will see large insects that may become somewhat incapacitated, even temporarily, after coming into direct contact with the herbicide and take it as prey. For reasons mentioned earlier, consumption of prey affected by the herbicides used in the GND is not expected to be toxic, or if so, only mildly so, to the birds.

Recent synonyms

Butcherbird, French mockingbird

Literature cited

Ashton, A. 2000.

Granholm B410.

Seattle Bird Web (Audubon Society). 2002.

Telfer, ES. 1992.

Western Riverside County Multiple Species Habitat Conservation Plan. 1999.

Hermit warbler *Dendroica occidentalis*

Status

Hermit warblers are a Category 3 special-status species (of some concern) due to their relatively high degree of habitat specialization, their limited breeding range along the west coast, and the continued threat of large-scale logging in that area (Audubon 2002-105). Hermit warblers hybridize with their close relatives, Townsend's warblers, where their ranges overlap and Townsend's may be out-competing and replacing hermit warblers across a considerable part of hermit warbler's breeding range (Audubon 2002-105).

A major threat to this species is the degradation or destruction of their breeding habitat that is only in coniferous forests with a well-developed canopy. In managed forests in Washington, hermit warblers are found in highest numbers in stands that are more than 30 years old, and are not found at all in conifer stands that are less than 20 years of age (Audubon 2002-105).

Much of the information presented for the hermit warbler is from Audubon (2002-105) unless otherwise cited.

Habitat and occurrence within the GND

Dames and Moore (1979) note hermit warblers as common migrants, but without observing them directly. Burton and Kutilek (1991) and Unocal (1999-2004) confirm their occurrence in coastal dune and riparian habitats. Burton and Kutilek (1991) observed just two hermit warblers during their yearlong study at Oso Flaco Lake. The species is reported to occur in all seasons but are not reported to breed in the GND.

Habitat in other areas

Hermit warblers prefer cool, wet coniferous forests of fir, Douglas fir, hemlock, and western red cedar. During migration, they may occupy deciduous woods in addition to conifers (Kaufman 1996).

Present status within the GND

Hermit warbler commonly observed in the GND by members of the Morro Coast Audubon Society, principally in the vegetation of the various camp grounds (MCAS 2004, 2005). They were also reported in recent Unocal monitoring efforts in the GOF (Unocal 1999-2004).

Life history

Hermit warblers migrate primarily through southern Arizona and the Pacific states and typically arrive in central California mid-April and at northernmost breeding range by the end of April. Although some hermit warblers winter along the coast of Central and Southern California, they winter primarily in the mountains of western Mexico, south to Guatemala, Honduras, and Nicaragua where they are found in montane pine-oak or pine forests. On their breeding grounds, hermit warblers are birds of coniferous forests; preferring cool, wet fir forests at elevation, and moist forests of douglas-fir, hemlock, and western red cedar closer to sea level. They nest at relatively high heights, with females building nests on branches anywhere from 20 to 120 feet above the ground.

Hermit warblers employ a number of different foraging techniques, including sallying, hover-gleaning, and gleaning from a perch, to catch spiders, caterpillars, beetles, and other invertebrates. They often forage near the tops of massive trees, sometimes at heights of up to 200 feet above ground.

Potential effects of invasive plant species control methods

The habit of hermit warblers of foraging in vegetation as some distance above the ground makes it unlikely that they would be affected by any invasive plant control methods currently in use in the GND.

Literature cited

Audubon Society. 2002-105.

Kaufman, K. 1996.

Pearson, S. F. 1997.

Yellow warbler ***Dendroica petechia***

Status

The yellow warbler is a Category 2 special-status species (sensitive) due to population declines brought about in part due to destruction of riparian habitat, its primary habitat. Once a common to locally abundant summer resident in riparian areas virtually throughout California, today it is much reduced and extirpated in some areas. Although destruction of riparian habitat has contributed to their decline, their absence from many areas of suitable habitat and its susceptibility to cowbird parasitism indicates that the population explosion of the brown-headed cowbird may be a key factor in their decline and similar to the circumstances for another riparian species, the least Bell's vireo.

California Department of Fish and Game has made recommendations for conservation of the species: (1) Protect riparian habitats throughout California, especially in the San Joaquin and Colorado River valleys. (2) Initiate cowbird removal programs at a local level on an experimental basis. (3) Restore willow-cottonwood riparian woodland along the Colorado River (Audubon Society 2002-376; Green B430; Lowther, et al. 1999).

Habitat and occurrence within the GND

MCAS reports of yellow warblers singing in the willows at the Santa Maria River Estuary in August 2000 and 2001; and in eucalyptus at the Oceano campground in September 2000, August 2001, and September 2002.

They are known to breed in the GND (Table 6.10-3). As stated earlier, the dense willow-riparian habitat in the dunes is a likely location for nesting. For birds occurring in Santa Barbara County, and probably San Luis Obispo County as well, Lehman (1994) states "Yellow warbler breed in riparian woodland containing willows, black or Fremont cottonwoods, California bay, big-leaf maple, California sycamore or white alder. Wintering individuals are found in willow riparian and several ornamental plantings including blooming eucalyptus, *Myoporum laetum* and *Pitosporum* spp [trees]."

Habitat in other areas

Yellow warblers are uncommon to common summer residents in the north part of California. In southern California they are locally common in the summer and are rare but regular in winter. In summer, yellow warblers are usually found in riparian deciduous habitats with cottonwoods, willows, alders, and other small trees and shrubs typical of low, open-canopy riparian woodland. They may breed in montane chaparral, and in open ponderosa pine and mixed conifer habitats with substantial amounts of brush. In migration, yellow warblers visit woodland, forest, and shrub habitats (Audubon Society 2002-376; Green B430; Lowther, et al 1999).

Present status within the GND

Yellow warblers are commonly encountered in coastal dune scrub, riparian, oak woodland and eucalyptus forest habitats from spring through fall by all core authors and MCAS birders. A recent sighting was in Oceano campground in summer 2005 (MCAS 2005).

Life history

Yellow warblers are long-distance migrants that usually arrive in California in April, and are mostly gone by October to winter areas in southern Mexico and Central America (Green B430).

The diet of yellow warblers is almost exclusively insects and spiders. They may consume caterpillars that defoliate trees and shrubs in large numbers. Food capture occurs while gleaning prey from small limbs and foliage or hovering in the upper canopy of deciduous trees and shrubs. Yellow warblers forage at various levels in the vegetation. Occasionally the species “hawks” (fly out to catch prey in midair) insects from air. They may eat berries in late summer.

They can be difficult to see because they generally inhabit dense vegetation, but during the breeding season, the males’ distinctive song is a helpful way to locate them (Audubon Society 2002-376; Green B430; Lowther et al. 1999).

Potential effects of invasive plant species control methods

Because of its preferred habitat in dense riparian habitat, the yellow warbler is unlikely to be affected by invasive plant control measures currently in use in the GND because riparian areas are only lightly treated. Their general foraging habits of taking insects from the upper canopy of trees places them at minimal risk from any potential herbicide exposure.

Literature cited

Audubon Society (Seattle Bird Web). 2002-376

Green, M. (B430).

Lowther, P. et al. 1999.

MCAS. 2005. (Morro Coast Audubon Society).

Yellow-breasted chat *Icteria virens*

Status

The Yellow-breasted chat is a Category 2 special-status species (sensitive) due to habitat loss. As farmlands and pastures disappeared and reverted to forests or were developed, populations of chats declined, particularly throughout much of the species’ eastern range.

Recommendations for yellow-breasted chat habitat management suggest creating shrub or hedgerows or thickets of raspberry, rose or greenbrier to provide nesting locations. In addition maintaining old field, farm, and pasture habitats is one of the best ways to help this species (CDEP 2000).

Habitat and occurrence within the GND

Icteria virens is an uncommon spring and summer visitor to the GND (Dames & Moore 1979; UNOCAL 1999-2004 QEMRs), reported only from riparian habitat, including Black Lake Canyon (McClelland Engineers, Inc. 1988).

Habitat in other areas

Yellow-breasted chat favor woodland edges; dense thickets, especially of briers and brambles; shrubby old fields, stream thickets and swamp margins. Also found in successional habitats, overgrown fields, abundant thickets, and gardens (Kaufman 1996).

Present status within the GND

Recent sightings (2 May 2004) by Morro Coast Audubon Society birders report yellow-breasted chat as an uncommon spring migrant along the GND coastal region (MCAS written communication).

Life history

The yellow-breasted chat ranges from southern Canada and British Columbia east to southern New Hampshire and south to northern Florida, the Gulf Coast and Baja, California. They winter from southern Texas and central Mexico south through the Yucatan to western Panama (Kaufman 1996). They are known to nest from the Arctic Circle to Mexico (Kauffman 1996).

Yellow-breasted chat feed primarily on insects, including bees, wasps, ants, grasshoppers, mayflies, treehoppers, moths, mosquitoes, damselflies and beetles; but also takes berries and wild grapes (Kaufman 1996). They forage in the canopy of trees and shrubs, taking insects and spiders from branches, twigs and leaves, sometimes while hovering (Sibley et al. 2001).

Potential effects of invasive plant species control methods

The potential for yellow-breasted chats to be affected by current invasive plant species control measures is likely minimal, if any at all, due to its preferred habitat in thicker shrubby areas and it foraging behavior in the top branches of trees and bushes, areas not currently treated for invasive species.

Literature cited

CDEP 2000. (Conneticut Dept. Environ. Protection)

Kaufman, K. 1996.

Sibley, D. et al. 2001.

Prothonotary warbler *Protonotaria citrea*

Status

Prothonotary warblers are a Category 3 special-status species (of some concern). The Audubon Society has them as a yellow listed bird due to destruction of mangrove habitat in their wintering areas in Central and South America and to destruction of prime nesting habitat in the lowlands of the southeastern U.S. (Audubon Society 2002-165)

Habitat and occurrence within the GND

Prothonotary warblers have been observed occasionally at Pismo State Beach Oceano Campground, in the spring and fall (MCAS 2004, 2005).

Habitat in other areas

These warblers prefer seasonally flooded deciduous woods, swamps and bottomlands along slow moving rivers (Kaufman 1996; Audubon Society 2002-165).

Present status within the GND

These birds are accidental strays or vagrants to California (Kaufman 1996; Alderfer 2005). They have been observed in fall and spring in wooded areas of the State Park campgrounds in the GND (MCAS 2004-05).

Life history

Prothonotary warblers breed in the eastern and southeastern lowland areas of the U. S. often near or over standing water (Kaufman 1996; Alderfer 2006). They are one of the few warblers to nest in natural cavities and old woodpecker holes in trees and are known to use birdhouses set out by conservation organizations (Kaufman 1996; Audubon Society 2002-165). From breeding grounds, they migrate south to spend winters in the lowland tropics and mangrove swamps.

The prey of prothonotary warblers is mainly insects and snails. The insects are adult and larvae of mostly aquatic insects but also includes ants, caterpillars, midges, mayflies and beetles and also snails and other small mollusks, spiders and some seeds (Kaufman 1996). Prey are gleaned from the foliage normally in low thickets and usually above the water (Kaufman 1996; Audubon Society 2002-165). On their wintering grounds, they may eat primarily plant material including seeds and fruits but also take insects (Audubon Society 2002-165).

Potential effects of invasive plant species control methods

Unknown but can reasonable be expected to be essentially negligible due to their apparent rarity in GND habitats and their feeding habits of taking prey in thick vegetation usually over water, areas generally not currently treated for invasive plant species in the GND.

Literature cited

Alderfer, J. 2006.

Audubon Society. 2002-165.

Kaufman, K. 1996.

MCAS. 2004, 2005. (Morro Coast Audubon Society).

Lucy's warbler *Vermivora luciae*

Status

Lucy's warbler is a Category 3 special-status species (of some concern) due to loss of streamside vegetation, clearing of mesquite woods and increase in thickets of introduced tamarisk in arid southwest (Kaufman 1996; Alderfer 2006).

Habitat and occurrence within the GND

Lucy's warbler has been observed in the State Park campground at Oceano Beach (MCAS 2005).

Habitat in other areas

Primarily a desert species found in mainly the Sonoran desert but occurs in the Mojave. Inhabits mesquite, willows and cottonwood areas along desert streams (Kaufman 1996). Also occurs in sycamore and live oak groves near streams in canyons close to arid lowland areas (Kaufman 1996).

Present status within the GND

An uncommon vagrant visitor in the GND. A recent sighting was in October, 2005 (MCAS 2005).

Life history

The diet of Lucy's warbler is not well known but they undoubtedly feed mostly or entirely on insects (Kaufman 1996). One of the few warblers that breeds in natural cavities (woodpecker hollows and under bark on trees) in desert areas of southwest. Winters along Pacific coast of western mainland Mexico (Alderfer 2006). A casual visitor to the California coast in late summer to early winter (Kaufman 1996).

Potential effects of invasive plant species control methods

Unknown but any effect to Lucy's warbler can be expected to be negligible, if any at all, due, in part, to their apparent very rare occurrence in the GND. Their preferred habitat of brushy riparian areas is not an area currently treated for invasive plants in the GND.

Literature cited

Alderfer, J. 2006.

Kaufman, K. 1996.

Tri-color blackbird *Agelaius tricolor*

Status

The tri-color blackbird is a Category 2 special-status species (sensitive). The great majority of tri-colored are restricted to California (Alderfer 2006). Expansion of agriculture and other human settlement has led to significant losses of tri-colored blackbird preferred habitat of freshwater marsh, with an accompanying drop in population numbers (Audubon Society 2002-105). In California, tricolored blackbird numbers were reduced by 37 percent between 1994 and 1997 (Aldefer 2006).

USFWS and CDFG have supported the preparation of management guidelines, which call for prevention of habitat loss, managing public and private land to support increased breeding populations, and promotion of public awareness and support (Audubon Society 2002-105).

Habitat and occurrence within the GND

Although considered sensitive because of declining breeding habitat, tri-colored blackbirds have at times been locally abundant at Oso Flaco Lake in spring, summer and fall (Smith et al 1976; Burton and Kutilek 1991). Burton and Kutilek (1991) counted over 1,700 tri-colors (>5% of the total birds observed) in their yearlong quantitative census. In the Guadalupe-Nipomo Dunes this species is noted from wetland (cattail tule marsh) and riparian habitats plus coastal dune scrub (Appendix D). They are known to breed in the GND (Table 9.10-3).

Habitat in other areas

More than 99 percent of tri-colored blackbirds live in California, with most of the largest colonies historically in the Sacramento and San Joaquin valleys. In the 1930s, the vast majority of tri-colored blackbird colonies were in freshwater marshes dominated by cattails or bulrushes. By the 1970s, this tendency had dramatically changed; only about half of observed colonies were in such marshes, with others in upland or agricultural areas. In wetland habitat, tri-color blackbirds seek cover and roost in large flocks among emergent wetland vegetation, especially cattails and tules; and in nearby trees and shrubs (from Audubon Society 2002-105 and Granholm B520).

Present status within the GND

Tri-colored blackbirds have apparently not been observed in the GND since about 2001 (MCAS reports, T. Edell written communication August 2005). Unocal did not observe the species in their quarterly monitoring efforts. They occur ephemerally, but in large numbers when they do occur. Their relatively recent apparent change in habitat preference from freshwater marsh to agriculture areas may also affect their abundance in the GND.

Life history

Tri-colored blackbirds, a West coast native species, are quite similar to the ubiquitous (occurring virtually throughout North America) red-winged blackbird but, though the ranges of the two species overlap, they are genetically, behaviorally, and morphologically distinct (Audubon Society 2002-105). They form large flocks and are almost never observed as single individuals.

Tri-colored blackbirds feed on a variety of insects, other invertebrates, and grain. In California, animal matter, mostly insects and spiders, made up 86-91% of nestling and fledgling diet, and 28-96% of adult diet in spring and summer (Skorupa et al. 1980). Seeds and cultivated grains, such as rice and oats, are other major foods, composing most of fall and winter diet. Tri-colored blackbird forages on the ground in croplands, grassy fields, flooded land, and along edges of ponds (Granholm B520).

In publications from the 1970s, tri-colored blackbirds were considered non-migratory over most of their range, except during fall and winter in northeastern California, when they presumably migrated south (Granholm B520). Granholm (B520) described flocks becoming nomadic in fall and winter seeking food. This pattern may be changing in light of the observations that, while the tri-coloreds may be declining in California, they have increased their breeding areas north into Washington State (Alderfer 2006). Also, they seem to have widened their breeding habitat from tule marshes to Himalayan blackberry brambles (Alderfer 2006). Recent observations suggest new foraging preferences for upland and agriculture fields (Audubon Society 2002-105).

The usual tri-colored blackbird breeding season runs from mid-April into late July. Orians (1960, 1961) reported active breeding in October and November in Sacramento Valley. The birds breeding in the GND were not observed in winter, presumably moving to the south and east for the winter.

Potential effects of invasive plant species control methods

Tri-colored blackbirds seem to preferentially feed in the marsh and riparian habitats where they were observed in the GND but are also known to forage for insects in more open short grasslands and coastal sage scrub. This could potentially put them into areas where veldt grass was treated with herbicides although there are not observations of birds feeding in these areas within the GND. However, for reasons explained previously, in the advent that tri-coloreds ingest insects that had come into contact with the herbicides currently in use in the GND, they would be expected to be little affected, if at all.

Literature cited

Alderfer, J. 2006.

Audubon Society. 2002-105.

Granholm, S. B520.

Orians, G. H. 1960. Autumnal breeding in the Tri-colored blackbird. Auk 77:379-398.

Orians, G. H. 1961. The ecology of blackbird (*Agelaius*) social systems. Ecol. Monogr. 31:285-312.

Skorupa, J. et al. 1980

Yellow-headed blackbird *Xanthocephalus xanthocephalus*

Status

Yellow-headed blackbirds are a Category 3 special-status species (of some concern). They have no formal conservation standing but they are listed and tracked in the California special animals database (CDFG 2004).

Habitat and occurrence within the GND

Yellow-headed blackbirds have been observed in and around Oso Flaco Lake and long Arroyo Grande Creek, approximately 0.5 mile upstream from the creek mouth (near the horse stables).

Habitat in other areas

Usually associated with wetlands such as freshwater sloughs, marshy lake borders and areas of tall cattails but also occurs commonly in open pastures, plowed fields, cattle pens and feedlots (Kaufman 1996).

Present status within the GND

Small groups of yellow-headed blackbirds, consisting of single birds to groups of 10 to over 20 birds, are occasionally observed in the fall and spring in various GND wetland habitats, usually either Oso Flaco Lake or along Arroyo Grande Creek near the horse stables (MCAS 2004, 2005).

<u>Life history</u>

In summer, yellow-headed blackbirds feed heavily on insects, mainly beetles, caterpillars, and grasshoppers, but also including ants, wasps, and others, plus spiders and some snails (Kaufman 1996). However, an estimated two-thirds of the diet of yellow-headed blackbirds consists of grass and weed seeds and waste grain (Kaufman 1996). They foraging while walking in open fields or near margins of ponds, lakes and rivers or in marsh vegetation (Kaufman 1996). Generally forage in flocks but may forage solo in breeding season.

Yellow-headed blackbirds are migratory between breeding areas in the northwestern one-half of the U.S. to their wintering areas from the southern southwest into Mexico (Kaufman 1996; Alderfer 2006). They appear to be essentially resident species from inland areas of Central California south into Mexico (Kaufman 1996; Alderfer 2006).

<u>Potential effects of invasive plant species control methods</u>

Although largely unknown, the effects, if any, from any plant control methods currently in use in the GND can be reasonably expected to be negligible for yellow-headed blackbirds. A greater potential source of risk for this species may be associated with the agricultural areas nearby to the GND, associated with use of agricultural pesticides.

<u>Literature cited</u>

Alderfer, J. 2006.

CDFG. 2004. (California Department of Fish and Game).

Kaufman, K. 1996.

MCAS. 2004, 2005. (Morro Coast Audubon Society).

Summer tanager *Piranga rubra*

<u>Status</u>

Summer tanagers are a Category 2 special-status species (sensitive) due to loss of habitat, primarily riparian areas along flowing rivers in the southwestern U.S. In other parts of their range in the southeastern U.S. summer tanagers are common and widespread (Kauffman 1996).

<u>Habitat and occurrence within the GND</u>

Summer tanagers have been observed by members of MCAS during the late fall and winter in the State Parks campgrounds at Oceano Beach and Pismo Beach and in the monarch grove at Pismo Beach (MCAS 2004, 2005).

Habitat in other areas

In the Southwest, summer tanagers prefer woods and groves of cottonwoods and willows along streams. They breed in deciduous forests in the southeastern U.S. or along edges of woods and second growth areas (Sibley et al. 2001).

Present status within the GND

Summer tanagers are observed occasionally in the various campgrounds associated with the GND. They were recently observed in the campground at Pismo State Beach in November/December 2006 (MCAS 2006).

Life history

Summer tanagers breed in the southeastern U. S., west to areas in the Southwest and northern Mexico (Kaufman 1996). They are migratory and winter in areas from the southern states, and parts of the Southwest, southward into Mexico and northern South America (Alderfer 2006).

On their summer breeding grounds, summer tanagers prey on insects almost exclusively. They are known to be “bee specialists,” often raiding bee and wasp nests; they are also known to raid commercial bee hives (Kaufman 1996). Other insects taken include beetles, cicadas, caterpillars, grasshoppers, flies, and some spiders (Kaufman 1996). They do feed on berries and small fruits at times, especially during migration and on winter grounds (Sibley, et al. 2001). Foraging is done mainly in the upper canopy of trees. Insects, seeds, and fruits are gleaned from the leaves; some insects may be taken in midair (Kaufman 1996).

Potential effects of invasive plant species control methods

Unknown but may reasonably be expected to be negligible due to its apparent rarity in the GND and its habit of foraging for primarily insects in the upper levels of tree canopies.

Literature cited

Alderfer, J. 2006

Kaufman, K. 1996.

MCAS. 2004-2006. (Morro Coast Audubon Society).

Sibley, D. et al. 2001.

Lark sparrow *Chondestes grammacus*

Status

Lark sparrows are a Category 3 special-status species (of some concern) for nesting birds (CDFG 2004). Lark sparrows have no formal listing designation but are on the California special animals list (CDFG 2004). Some populations have disappeared east of the Mississippi River but remain fairly common and widespread in the west (Kaufman 1996).

Habitat and occurrence within the GND

In the GND, lark sparrows are known from the coastal dune scrub habitat.

Habitat in other areas

Lark sparrows prefer open habitat such as grasslands and pastures with a scattered shrub layer (Kaufman 1996; Sibley et al. 2001). They are often found at the edge between grasslands and shrub lands, in degraded shrub-steppe, or in open forests and grasslands (Audubon Society 2002-410). These birds are also found in overgrazed pastures, sandy barrens, hedgerows near fallow fields and brushy dry grasslands (Kaufman 1996).

Present status within the GND

Unknown, but presumably still occurs in GND coastal sage scrub or other open habitat. Unocal (2002-2004) reports lark sparrow occasionally.

Life history

Lark sparrows breed throughout the Midwest, into the southwestern states and northward into Canada. They migrate south to winter in areas along coastal California, the southern southwest and into Mexico (Alderfer 2006).

Lark sparrows feed heavily on seeds, including grasses, weeds and waste grains, particularly in winter (Kaufman 1996). In the summer, their diet may be mainly insects, especially grasshoppers, beetles, and caterpillars. Young are fed insects almost exclusively (Audubon Society 2002-410).

Prey are taken while walking about on the ground in open areas, typically in small flocks (Kaufman 1996).

Potential effects of invasive plant species control methods

Unknown. Lark sparrows are known to forage in the coastal sage scrub habitat, an area treated for veldt grass in the GND.

Literature cited

Alderfer, J. 2006.

Audubon Society (Seattle BirdWeb). 2002-410.

CDFG. 2004. (California Department of Fish and Game).

Kaufman, K. 1996.

Sibley, D., et al. 2001.

Chipping sparrow ***Spizella passerina***

Status

Chipping sparrows are a Category 3 special-status species (of some concern). Similar to lark sparrows, chipping sparrows have no formal listing designation by federal or state agencies or conservation groups but are on the California special species list (CDFG 2004). They are common and widespread throughout the U.S. Their populations appear stable and they have generally benefited from human activities such as clearing of forests and creation of open, grassy parks (Kaufman 1996; Alderfer 2006).

Habitat and occurrence within the GND

Chipping sparrows have been observed in foredune, dune swale, coastal sage scrub habitats as well as riparian, oak and eucalyptus woodlands (Smith et al. 1976; Dames and Moore 1979).

Habitat in other areas

Open woodlands of oak or conifers, orchards, towns, and city parks (Kaufman 1996). Also found in grassy areas and open areas along lake and river shores (Sibley et al. 2001).

Present status within the GND

Chipping sparrows occur commonly in various GND habitats (T. Edell, personal communication. 2005). Although chipping sparrows are resident species in California in the general vicinity of the GND (Alderfer 2006), they are not known to breed in the GND.

Life history

As with many birds, the diet of chipping sparrows varies with the season. In summer, they feed mainly on insects such as grasshoppers, caterpillars, leafhoppers, beetles, true bugs and also spicers (Kaufman 1996). They eat seeds in fall and winter including seeds of grass and weeds (Kaufman 1996; Cornell Bird Lab 2003i).

Chipping sparrows forage for food mostly on the ground but may take food items in shrubs and low trees (Kaufman 1996). May catch insects in mid-air.

Chipping sparrows breed through the U. S. and are residents in the southern portion (Alderfer 2006). Winter areas are from the southern tier of the U.S. into Mexico and central America (Alderfer 2006).

<u>Potential effects of invasive plant species control methods</u>

Unknown but since they are ground foragers known to eat grass seeds, there may be some potential for chipping sparrows to come into contact with seeds treated with herbicides used in the GND. However, as explained previously, these herbicides are not known to affect vertebrates except through inhalation while applying the herbicides (i.e., humans).

<u>Literature cited</u>

Alderfer, J. 2006.

CDFG. 2004. (California Department of Fish and Game).

Cornell Bird Lab. 2003l.

Kaufman, K. 1996.

Sibley, D. et al. 2001.

Lawrence's goldfinch *Carduelis lawrencei*

<u>Status</u>

Lawrence's goldfinch is a Category 3 special-status species (of some concern) due to losses in nesting habitat the rising human population and accompanying development. The Breeding Bird Survey data between 1966 and 1993 show a downward but inconclusive trend in overall population size. With its relatively small overall population size, habitat loss from such encroachment may put the species at some risk (Audubon Society 2002-117).

<u>Habitat and occurrence within the GND</u>

Lawrence's goldfinches are reported to occur in foredune, dune swale, coastal dune scrub, riparian, oak woodland, and eucalyptus forest in the GND (Smith et al 1976; Entrix Inc. 1996). They have been observed in all seasons of the year (Table 6.10) but are not known to breed in the GND (Table 6.10-3). Some of these areas may just be for roosting or passing through. The more important habitat with respect to *C. lawrencei* foraging in the GND is likely the CDS where annual plants occur in high density.

Habitat in other areas

Lawrence’s goldfinch requires open woodland or shrubland habitat, a nearby source of water, and forb and shrub seeds. They prefer brushy areas along riparian corridors, but are also found in oak-pine woodlands and chaparral (Kaufman 1996; Alderfer 2006). Lawrence's goldfinches typically nest in arid, open woodlands near chaparral, weed fields, and small bodies of water.

Present status within the GND

The species is noted to occur year round in the GND. Two of the most recent observations are in October 2000 at Oso Flaco Lake and in April 2000 in the pine trees near the Oceano Lagoon and campground ranger station (MCAS reports). They are not reported by Unocal in their quarterly monitoring efforts up to 2005.

Life history

Lawrence’s goldfinch is endemic to the arid woodlands of California and northern Baja California, Mexico. Movements of Lawrence’s goldfinch between breeding and wintering grounds are erratic and complex. The breeding range of the species is confined to the Central Valley and coastal foothills of California to northern Baja California, Mexico. Their winter range encompasses southern Arizona, southwestern New Mexico, and northern Mexico. Their distribution within this range often varies widely from year to year with the result that, in some years, they seem to be virtually absent from their breeding range altogether, without appearing elsewhere. Breeding generally occurs between mid-April and late July (Audubon Society 2002-117).

Their diet is mainly seeds of trees, wildflowers (especially composites) and shrubs and are specialists in foraging on thistle seeds (Sibley et al 2001). Favored seeds include pigweed (*Amaranthus* sp.), fiddleneck (*Amsinckia* sp.), starthistle (*Centaurea* sp.), and chamise (*Adenostoma* sp.; Martin et al. 1961). Feeds by plucking seeds from plants but will also glean seeds from ground (Granholm B544). They also take some insects (Kaufman 1996). They generally feed in pairs or small flocks (Audubon Society 2002-117).

Potential effects of invasive plant species control methods

It is unlikely that Lawrence’s goldfinch would be affected by current weed control methods in the GND because their diet does not include seeds from the species targeted for control. Although Lawrence’s goldfinch may forage in the coastal dune scrub habitat where areas of veldt grass may have been treated with herbicides, they forage mainly on seeds of forbs and not grasses. Their intake of insects is similarly very limited and would seem unlikely that they would inject insects that had come into contact with herbicides.

Literature cited

Alderfer, J. 2006.

Audubon Society. 2002-117.

Granholm, S. B544.

Kaufman, K. 1996.

Sibley et al. 2001.

<u>Special-status passerine subspecies that MAY occur in the GND</u>

The following three passerine species are known to occur in the GND. However, in each case there are subspecies that are either state or federal endangered (Category 1 for this report). Also in each case, it is either unconfirmed or uncertain whether the birds identified were or were not the endangered subspecies. Therefore, the presence of these subspecies is unconfirmed in the GND.

Southwestern willow flycatcher *Empidonax trailii extimus*

The endangered Southwestern willow flycatcher is **unconfirmed** in the Guadalupe-Nipomo Dunes.

<u>Status</u>

Both State and federal governments list the Southwestern willow flycatcher as endangered. Since February 1995 (USFWS 1995), it has been designated as federally endangered in its entire range of nesting areas along streams in the southwest (Kaufman 1996). Critical Habitat was designated for this bird species (62 FR 39129-39147, 1997 July 22), but was later vacated. A Recovery Plan was completed on August 30, 2002 (see http://ecos.fws.gov/docs/recovery_plans/2002/020830c.pdf).

The Southwestern willow flycatcher is one of five subspecies of the willow flycatcher (*Empidonax traillii*). Because it is restricted to river corridors in the more arid parts of the country it is especially vulnerable to human activity that degrades their riparian habitat. These activities include removing, thinning, or destroying riparian vegetation; water diversions and groundwater pumping which alter riparian vegetation, food availability and nesting; overstocking or other mismanagement of livestock; and recreational development (USFWS 2004). In recent decades, nest parasitism by brown-headed cowbirds has also contributed significantly to their decline (Audubon Society 2002-217).

<u>Habitat and occurrence within the GND</u>

Southwestern willow flycatcher has <u>**not**</u> been confirmed to occur in the Guadalupe-Nipomo Dunes. However, speculation of their occurrence in the GND has been mentioned by Entrix Inc. (1996) and in Black Lake Canyon by McClelland Engineers, Inc. (1988). Marantz (1986) reports the species (*E. traillii*) are "most common as fall transients in September, at which time a small number can usually be found at coastal migrant 'traps'". He reports "two willow flycatchers were observed at Oceano" on 31 August 1985 by Brad Schram (MCAS). The speculative habitat associations includes: central dune scrub, riverine, riparian, and agricultural.

<u>Habitat in other areas</u>

This species prefers shrubby riparian habitat in broad, open river valleys or large mountain meadows. They appear to prefer to nest and roost in dense willow thickets near water, either slow streams, seeps, ponds, or wet meadows. Low, exposed branches are used for singing posts and hunting perches.

<u>Present status within the GND</u>

There are no recent sightings of this species (*E. trailii*) or subspecies (*E. t. extimus*) of flycatcher. Morro Coast Audubon Society considers the potential for presence of the Southwestern willow flycatcher in the GND to be highly unlikely (T. Edell written communication, 2005).

<u>Life history</u>

This is a long distance migrant. Birds migrate over much of the southern U. S. in late summer to early fall to wintering sites in southern Mexico, Central America and northern South America, returning north in late spring (Thelander and Crabtree 1994).

The Southwestern willow flycatcher is an insectivore and forages within and above dense riparian vegetation. Foraging occurs in the air and among various kinds of vegetation. Like other tyrant flycatchers, willow flycatchers are sit-and-wait predators (Sibley et al. 2001). When suitable prey are sighted, the flycatcher makes a short flight for flying insects from exposed perches in willow thickets or from low perches in adjacent meadows. They also take prey by 'hover gleaning' where they are nearly motionless in flight and pick insects from the foliage (Thelander and Crabtree 1994). Occasionally, the species eats berries and seeds (Gaines B315).

Historically, the southwestern willow flycatcher nested primarily in willows, buttonbush, and coyote brush, with a scattered overstory of cottonwood (*Populus* spp.) along rivers, streams or other wetlands in the arid southwest (Kaufman 1996; Sibley et al. 2001). It still nests in native vegetation where available, but has been known to nest in thickets dominated by tamarisk. They nest near surface water or the damp soil of intermittent streams that support the riparian vegetation

This species was, historically, a common breeder in willow thickets throughout most of lowland and montane California, but now it is rarely found. Currently, its breeding range in California is limited primarily to suitable habitat at elevations ranging from 2,000 to 8,000 feet in the Sierra Nevada and Cascade Range (Thelander and Crabtree 1994).

Breeding occurrences in lowland California are very rare and limited to southern California, although the breeding range includes Arizona and adjacent states.

Brood parasitism by the brown-headed cowbird has a significant, negative affect on the nesting success of the willow flycatcher. This activity varies both in time and location, with some areas being more affected than others (Gaines B315; Thelander and Crabtree 1994).

Potential effects of invasive plant species control methods

The potential for the Southwestern willow flycatcher, if present in the GND, to be affected by current invasive plant species control measures can be expected to be almost insignificant due, in part, to its apparent rarity in the GND, and to its foraging behavior of taking prey in fairly dense riparian vegetation, which is largely not treated by current weed control methods.

Recent synonyms

Before 1955, the willow (*E. traillii*) and alder (*E. alnorum*) flycatchers were considered a single species, “Traill’s Flycatcher” (Sibley et al. 2001). The two species are most notably separated by their distinct vocalizations and nest structure.

Literature cited

Audubon Society. 2002-217].

Gaines, D. B315.

Kaufman, K. 1996.

Sibley, D et al. 2001.

Thelander, C., and M. Crabtree. 1994

USFWS (United States Fish and Wildlife Service). 1995

USFWS 2004a.

Bell's sage sparrow ***Amphispiza belli belli***

Although sage sparrows are known to occur in GND and are reported to breed there, the subspecies known as Bell's sage sparrow is **unconfirmed** in the Guadalupe-Nipomo Dunes.

Five subspecies of *Amphispiza belli* are currently recognized: *belli, clementeae, cinerea, canescens,* and *nevadensis* (Chase and Carlson 2002). Four of the five subspecies occur in California, but only two (*belli and canescens*) occur in the area covered by the Chaparral and Coastal Scrub Bird Conservation Plan (CalPIF 2004). This species account will focus on the *A. b. belli* subspecies.

Status

Bell's sage sparrow subspecies, *A. b. belli*, is a Category 2 special-status species (sensitive) as defined here. They are listed by California Department of Fish and Game as a Bird Species of Special Concern due to habitat losses. In coastal scrub habitat, the invasion of exotic weeds, especially grasses and annual forbs, can cause increased fire frequency, complete loss of shrub cover, and pose serious threats to sage sparrows in these habitats (Carlson and Chase 2002). However, in chaparral habitats, where re-growth of shrubs following fire is common, prescribed fire may benefit sage sparrows (Carlson and Chase 2002).

Sage sparrows require extensive, semi-open habitats with evenly spaced shrubs 1-2 meters high. They benefit from controlled or natural burns with intermediate frequencies. Too frequent fires can convert shrubland habitat to grasslands, an unsuitable habitat for sage sparrows. Conversely, long-term fire suppression in chaparral allows taller, thicker chaparral to develop, which is less than optimum habitat for sage sparrow habitat. Similarly, other disturbances that eliminate shrubby vegetation, such as management practices used in some parts of the west to increase livestock forage, are not beneficial to sage sparrows. In coastal shrublands, these birds are highly sensitive to habitat fragmentation. Increased nest predation, resulting in lower sage sparrow productivity, in fragmented habitats is also a cause for concern (from Carlson and Chase 2002).

Habitat and occurrence within the GND

Bell's sage sparrow has **not** been confirmed to occur in the Guadalupe-Nipomo Dunes. Julie Schneider (Unocal consulting wildlife biologist, personal communication, Oct. 2004) reported sage sparrows (no subspecies given) were observed in coastal dune scrub habitat during the Unocal monitoring of the Guadalupe Oil Field, although we were unable to find it reported in any of the 13 QEMRs we reviewed.

Marantz (1986) reported sage sparrows (*A. belli*) are "rather rare" in San Luis Obispo County coastal district. *A. b. belli* prefers chaparral and coastal sage scrub habitats in the SLO County coastal district (Marantz 1986). He reports a sage sparrow at Black Lake Canyon in May 1982, which represents the only record for the south coast.

Lehman (1996) concluded singing sage sparrows in coastal sage scrub at Point Sal, Santa Barbara County, in May 1981 and 1989 and June 1990 were undoubtedly breeding locally. He further concluded that the breeding birds were of the coastal subspecies*, Amphispiza belli belli* (Bell's sage sparrow).

Since these reports of the 1980s and early 1990, only Unocal (1999-2004; J. Schneider written communication, Oct. 2004) has observed sage sparrows in dune habitats, but without subspecies confirmation. The speculative habitat associations include: foredune, dune swale, and coastal dune scrub.

Habitat in other areas

The subspecies occurred in the southern coastal region from San Diego to Santa Clara and Contra Costa counties, where relatively dry chaparral is dominated by chamise, *Adensostoma fasciculatum* (Chase and Carlson 2002). The most extensive population remaining near the coast is on the Marine Corps Air Station at Miramar, San Diego County, where they occur among the vernal pools and tracts of chamise and redshanks, *Adenostoma sparsifolium* (Chase and Carlson 2002).

Sage sparrows seek cover in fairly dense stands in chaparral and scrub habitats in breeding season. Depending on locality, they frequent sagebrush *(Artemisia),* saltbush (*Atriplex*)*,* bitterbrush or antelope bush (*Purshia*)*,* and *Adenostoma* spp. In winter, sage sparrows use more arid, open shrub habitats (Dobkin and Granholm B497).

Present status within the GND

There are no confirmed sightings of *Amphispiza belli belli* in the GND. There are no recent observations of sage sparrows, *A. belli*, in the GND.

Life history

Bell's sage sparrow is generally non-migratory, although northernmost California populations are reported move down-slope to lower elevations in winter. The subspecies probably winters in California (Carlson and Chase 2002).

During breeding season, *A. b. belli* feed on insects including grasshoppers, beetles, true bugs, leafhoppers and ants, spiders, seeds, small fruits, and succulent vegetation. They also eat seeds of many weeds, grasses, and shrubs (Kaufman 1996). In fall, winter, and early spring non-breeding seasons they consume small seeds, plant material, and insects when available.

A .b. belli breeds in dry chaparral, coastal sage scrub and chamise chaparral in the northern part of range and in coastal San Diego County (Bolger et al. 1997); and in tall sagebrush at higher elevations in Southern California mountains. They are much less common in tall stature, dense stands of old chaparral. Nests are located on the ground beneath a shrub; or in a shrub usually 6-18 inches above the ground. Sage sparrows breed from late March to mid-August, with a peak in May and June.

Potential effects of invasive plant species control methods

There appears to be some potential for Bell's sage sparrow to occur, and perhaps breed, in the GND but their occurrence is here considered **unconfirmed.** However, sage sparrows do occur and breed in coastal sage scrub in the GND, and there is some potential that they may ingest invertebrates (insects and spiders) or grass seeds, which have inadvertently come into contact with herbicides currently used in the GND. The preferred habitat of chaparral and coastal sage scrub with a fairly specific physiogonomy would seem to decrease the likely hood that these birds would forage for insects in areas most likely to be treated for invasive species. The likelihood that ingested food items that came into contact with these herbicides would be toxic to sage sparrows appears to be small for reasons explained previously.

<u>Literature cited</u>

Bolger, D. et al. 1997.

Chase, M. and B. Carlson. 2002.

Dobkin, D. and S. Granholm. B497.

Kaufman, K. 1996.

Lehman, P. 1994.

Marantz, C. 1986

Least Bell's vireo — *Vireo bellii pusillus*

<u>Status</u>

As a species, Bell's vireo, *Vireo bellii*, is fairly widespread in the Midwest and southwest where their population may be holding steady (Kaufman 1996). The evidence that the Bell's vireo seen rarely in the GND is that of the state and federally endangered least Bell's vireo subspecies, *V. bellii pusillus*, is equivocal. Based on available information, the confirmation that the subspecies of the birds observed in the GND are **least Bell's vireo** is speculative and their occurrence is **unconfirmed** in the GND (T. Edell, MCAS, written communication April 18, 2005)**.**

Bell's vireo, *Vireo bellii*, has been observed in the GND, but only casually and is not expected to breed in the area (T. Edell, MCAS, written communication. 2005). The least Bell's vireo is one of four subspecies of Bell's vireo recognized by the American Ornithologist's Union. It is the western-most subspecies, breeding entirely within California and northern Baja California (Audubon Society 2002-024).

The information presented here for Bell's vireo in the GND is for the least Bell's vireo. Much of the following information on least Bell's vireo is from Audubon (2002-024) and Kus (2002).

The least Bell's vireo is a Category 1 special-status species (highly sensitive). They were listed as a state endangered species in 1980, and as a federally endangered species in 1986. Critical habitat for the species was designated in 1994. They are extremely vulnerable to cowbird parasitism, which, in concert with habitat loss and degradation, primarily from cattle grazing in riparian corridors, is considered a primary factor responsible for the species decline (Audubon Society 2002-024).

The invasion of exotic plant species also degrades their preferred habitat by fragmenting riparian corridors, leading to a decrease in suitable nesting habitat for least Bell's vireo. Invasive non-natives found in current least Bell's vireo habitat include castor bean (*Ricinus communis*), cocklebur (*Xanthium strumarium*), tamarisk (*Tamarix* sp.) and giant reed (*Arundo donax*). *Arundo* is of prime concern due to its ability to disperse throughout the drainage and its rapid growth that allows it to out-compete and restrict growth of native riparian vegetation (Kus 2002).

<u>Habitat and occurrence within the GND</u>

Vireo bellii occurrence in the GND has been very rare. One report noted its occurrence at the mouth of Arroyo Grande Creek in riparian, and possibly riverine, habitats (Marantz 1986; T. Edell, MCAS, written communication, 2005).

A Biological Opinion submitted in Coastal Development Permit Application E99-009 for the Unocal GOF states, "the willow habitat in the project area is not considered sufficient to support southwestern willow flycatcher or least Bell's vireo…except as very brief transients."

<u>Habitat in other areas</u>

Historically, the least Bell's vireo was a common to locally abundant species along slow moving rivers in lowland riparian habitat, comprised mainly of willow, wild rose and other dense vegetation, from coastal southern California through the Sacramento and San Joaquin Valleys as far north as Red Bluff (Tehama County).

Unlike during the breeding season when they are pretty much limited to willow-dominated riparian areas, in their winter grounds in southern Baja California, Mexico, they occupy a variety of habitats including mesquite scrub within arroyos, palm groves, and hedgerows bordering agricultural and residential areas (Kus 2002).

<u>Present status within Guadalupe-Nipomo Dunes</u>

Unknown. No recent observations of Bell's vireo have been reported by anyone, since a suspected sighting in 1990 "near Guadalupe" (Lehman 1994).

In the decade since its federal listing in 1986, least Bell's vireo numbers have increased 6-fold, to about 2,000 pairs, and the species is expanding into its historic range. Known least Bell's vireo nesting areas in 1997 bracketed the GND from the Santa Clara River (Ventura County) north to near Gilroy (Santa Clara County). Roughly half of the current least Bell's vireo population occurs on drainages within the Camp Pendleton Marine Corps Base in San Diego County.

Life history

Least Bell's vireo begin returning to Southern California breeding sites in mid- to late-March from wintering areas. The primary winter areas are in southern Baja California, Mexico although they occasionally occur in California during the winter (all recorded in San Diego County). Least Bell's vireos are generally present on the breeding grounds until late September, but may begin departing by late July. The species as a whole described as using coastal scrub, riparian, and other woodland habitats during migration (Kaufman 1996). Other races or subspecies of Bell's vireo migrate to southern tropical habitats (Kaufman 1996).

Least Bell's vireos are insectivores, preying on a wide variety of insect types, including wasps, bees, weevils, beetles, grasshoppers, moths, and particularly caterpillars. Spiders can be an important food item (Kaufman 1996). They glean their prey from deciduous trees and shrubs, sometimes while hovering, or pick it out of the air (Thelacker 1992). Foraging occurs at all levels of the canopy, but appears to be concentrated in the lower to mid-strata, particularly when pairs have active nests. Least Bell's vireos rarely eat berries (Kaufman 1996).

Least Bell's vireos place their nests in a variety of plants that provide concealment in the form of dense foliage, usually near water bodies. The most frequently species used for nesting include willows (*Salix* sp.), mulefat (*Baccharis glutinosa*), California wild rose (*Rosa californica*), poison oak (*Toxicodendron diversilobum*), mugwort (*Artemisia douglasiana*), and cottonwood (*Populus fremontii*).

Although often victimized by cowbirds, this bird raises relatively few of the brood parasites, simply abandoning a nest when a cowbird's egg is laid in it.

Potential effects of invasive plant species control methods

Because of its preferred habitat in dense riparian habitat, least Bell's vireo is unlikely to be affected by invasive plant control measures currently in use in the GND because riparian areas are only lightly treated. Their foraging method of taking insects primarily from deciduous plants would make it highly unlikely that they would encounter any insects inadvertently sprayed with herbicide.

Literature cited

Audubon Society. 2002-024.

Kaufman, K. 1996.

Kus, B. 2002.

Lehman, P. 1994.

Marantz, C. 1986.

Thelander, C. 1992.

7.0 MAMMALS

7.1 Introduction

Mammals are the ‘charismatic megafauna’ of most animal assemblages for a specific geographic area. The majority of mammals are terrestrial, including such less-than-charismatic taxa such as Norway rats, but among the most charismatic of the mammals are aquatic species – whales, porpoise, seals, sea lions, sea otters and so forth. The mammals presented here are the terrestrial taxa. The obviously marine aquatic species, recorded in the literature as occurring in the GND, are omitted here as they are characteristic of oceanic environments and occur offshore of a very wide variety of terrestrial habitats including the GND. However, Appendix H presents the marine fauna, invertebrates, fishes and mammals, reported to occur in the nearshore waters of the GND.

This chapter presents information pertaining to confirmed and unconfirmed mammals in the GND, along with sections on possible impacts to mammals from current control methods for invasive plant species, habitat associations of mammals, and species accounts of confirmed mammals.

7.2 Findings

Thirty-three (33) mammal species are confirmed to occur in the GND (Table 7.1). Appendix E presents these species, along with habitats they were observed in and the reference sources. Of these 33 species, no known threatened, endangered, or endemic mammals occur in the GND, and only one species is a special-status (Table 7.1).

An additional 24 mammal species have been variously reported as possibly occurring in the GND, but their presence has not been documented (Table 7.2). Most of these unconfirmed mammals are bats (15 species) and rodents (6 species). Appendix E-1 presents these unconfirmed mammal species, their expected GND habitat relationship and their reference sources.

The number of mammalian species known to occur in the GND compare favorably to the number of species in other areas of similar extent. For example, a focused study of the mammals of the 32 sq. mi. Deep Canyon area of Riverside County, California, by the University of California Riverside in 1968, recorded forty mammals with another 11 species probable and an additional 9 possible (Ryan 1968). This area was roughly half-again as large as the GND and ranged over 8,000 feet in elevation with habitats from coniferous forests to desert sand dunes.

Surveys focused on mammals throughout the GND will likely turn up more species. Surveys throughout the entire GND are necessary to better understand the abundance and distribution of mammals, but also invertebrates, amphibians, and reptiles. For example, M. Kutilek, author of two vertebrate studies in the GND and a specialist in large cats, related that he was certain mountain lions occurred in the GND, but he could find no evidence of them in his Oso Flaco Lake and SVRA study areas because of the temporal and spatial limitations of the scope of the studies (M. Kutilek, pers. comm. 1989).

Species	Common name	Legal status
Marsupiala		
Didelphis virginiana	Virginia opossum	
Insectivore		
Sorex ornatus	Ornate shrew	CDFG Species of Concern
Scapanus latimanus	Broad footed mole	
Chiroptera		
Myotis spp.?	Unidentified bat	
Carnivore		
Ursus americanus	American black bear	Species of local concern
Procyon lotor	Raccoon	
Mephitis mephitis	Striped skunk	
Mustela frenata	Long-tailed weasel	
Spilogale gracilus	Western spotted skunk	
Taxidea taxus	American badger	Species of local concern
Canis latrans	Coyote	
Urocyon cinereoargenteus	Gray fox	
Lynx rufus	Bobcat	
Puma (Felis) concolor	Mountain lion	Species of local concern
Rodenta		
Spermophilis beecheyi	California ground squirrel	
Thomomys bottae	Botta's pocket gopher	
Chaetodipus californicus	California pocket mouse	
Dipodomys agilis	Pacific kangaroo rat	
Dipodomys heermanni	Heermann's kangaroo rat	
Castor canadensis	American beaver	
Reithrodontomys megaloitis	Western harvest mouse	
Peromyscus californicus	California mouse	
Peromyscus maniculatus	Deer mouse	
Neotoma fuscipes	Dusky-footed wood rat	
Microtus californicus	California vole (meadow mouse)	
Ondatra zibethica	Common muskrat	
Mus musculuis	House mouse	
Mus spp.?	Unidentified mice	
Rattus rattus	Black rat	
Lepus californicus	Black-tailed jackrabbit	
Sylvilagus audubonii	Desert (Audubon's) cottontail	
Sylvilagus bachmani	Brush rabbit	
Sylvilagus spp.	Unidentified rabbit (Lagomorpha)	
Artiodactyla		
Odocoileus hemionus	Mule (black-tailed) deer	

Table 7.1 Confirmed Mammals in the GND

Species	Common name	Legal status
Insectivore		
Sorex towbridgii	Trowbridge's shrew	
Sorex vagrans	Vagrant shrew	
Chiroptera		
**Antrozonus pallidus*	Pallid bat	CDFG Species of Concern
**Corynorhininus townsendii*	Townsend's big-eared bat	CDFG Species of Concern USFS Sensitive Species
**Eptesicus fuscus*	Big brown bat	
**Lasionycteris noctivagans*	Silver haired bat	
**Lasiurus blossevillii*	Red bat	CDFG Species of Concern USFS Sensitive Species
**Lastiurus cinereus*	Hoary bat	
**Myotis californicus*	California myotis	
Myotis evotis	Long-eared myotis	
Myotis subulatus	Small-footed myotis	
Myotis thysanodes	Fringed myotis	
Myotis volans	Long-legged myotis	
**Myotis yumaenesis*	Yuma myotis	BLM Sensitive
Pipistrellus hesmerus	Western pipistrelle	
**Eumops perotis*	Western mastiff bat	CDFG Species of Concern
**Tadarida brasiliensi*s	Brazilian freetail bat	
Carnivore		
Bassariscus astutus	Ringtail	
Rodentia		
Sciurus griseus	Western gray squirrel	
Tamias merriami	Merriman's chipmunk	
Dipodomys venustus	Narrow-faced kangaroo rat	
Peromyscus boylii	Brush mouse	
Peromyscus truei	Pinion mouse	
Rattus norvegicus	Norway rat	

Asteris (*) denotes bat species that occur in VAFB habitats and also likely to occur in GND (from P. Collins, pers. comm. 2005)

Table 7.2 Mammals that may occur in the GND

7.3 Habitat associations

The following is a brief overview of mammals confirmed to occur in the GND. Appendix E summarizes the habitat associations of all confirmed and unconfirmed mammals.

Sandy beach, estuarine, active sand and foredune

Few mammals venture along the sandy beach, estuarine, active sand and foredune habitats. Only the coyote is consistently observed in all of these seashore habitats (Lotze and Anderson 1979). Virginia opossum, shrews, a few mice and rat species, raccoons, jackrabbit, bush bunnies and mule deer are occasionally seen (Anderson and Wallmo 1984). Tracks of American black bear have occasionally been noted along the beach (Dunes Center notice board, various times in 2003 and 2004); a black bear was seen on the beach in 2003 by reliable observers (C. Barr, pers. comm. 2005).

Marine mammals may play an important, although posthumous, role in the terrestrial ecosystem of the GND. Carcasses of dead harbor seals, California sea lions, various species of porpoise and even some larger baleen whales, occasionally wash up on the beaches of the GND, providing a source of nutrient to various animals. The role this food source plays in the ecology of the scavengers (including coyotes, raccoons, opossum, various carrion beetles, flies and probably many more animals) is unknown but suspected of being potentially an important and significant food source (G. Greenwald, USFWS, personal communication, 2006).

Dune swale

Mammals use (traverse, forage, reproduce or rest) all GND habitats. Based on available studies, the majority of mammals are confirmed to occur in dune swale habitats. Of the confirmed 33 species of mammals, only the American beaver and common muskrat do not utilize dune swale habitats, because they lack open water.

Dune swale habitats provide sticks and foliage for the dusky footed wood rat to construct their large nests among the willows (Carraway and Verts 1991). The nocturnal California mouse is often associated with these nests (Entrix Inc. 1996; Merritt 1978). Virginia opossum (McManus 1974) and ornate shrew (Owen and Hoffmann 1983) are also frequently found in the dune swales (Burton and Kutilek 1991; Kutilek, Shellhammer and Bros 1991). Track signs and night-time spotlighting detected American badger (Long 1973), bobcat (Smith 1980; Lariviere and Walton 1997), coyote (Bekof 1977), and gray fox (Fritzell and Haroldson 1982) in GND dune swale habitats.

Coastal dune scrub

To study mammals in the GND, Entrix Inc. (1996) and Kutilek et al. (1991) used small live-trap lines and Entrix Inc. (1996) used remote camera stations. These efforts were limited to a short time period and could not confirm habitat associations for over one-third of the mammal taxa observed in the coastal dune scrub.

Deer mice are the most abundant mammals in the GND coastal dune scrub (Kutilek et al. 1991). Other common mammals include Heermann's kangaroo rat, brush rabbit, and black tailed jackrabbit. Mule deer occupy most habitats but they are particularly visible in coastal dune scrub.

Wetland

Only the American beaver (Smith et al. 1976; J. Blecha pers. ob.) and common muskrat occur mainly in open water. Numerous shrews, raccoons, rats, mice and voles occur on the periphery of lakes, ponds and streams where coyote, bobcat, and gray fox hunt.

Riparian

Smith et al. (1976) and Entrix Inc. (1996) examined wildlife in riparian areas. They reported bobcats, weasels, skunks, raccoons, ground squirrels, rabbits, mice, and deer. Evidence of beaver activity, including dams, dens dug into the banks and chewed branches of arroyo willows, are common along the lower portions of Arroyo Grande Creek and in the Oceano Lagoon near the causeway (J. Blecha, C. Cleveland, pers. obs. 2003-06). Entrix Inc. (1996), report one badger den, in a willow riparian corridor, along the northern edge of the Santa Maria floodplain.

7.4 Brief account of GND mammals

The Virginia opossum (*Didelphis virginiana*) is an adaptable omnivore at home on the ground or in the trees. Eats virtually all things edible, plant or animal, including carrion. Most of the food of opossum consists of soil-dwelling insects, but also eats mice, birds eggs, nuts berries and other fruit and corn (Jameson and Peeters 2004). Likely largely unaffected by current invasive weed control methods used in the GND.

Coyotes (*Canis latrans*) are among the most adaptable mammals in North America. They have an enormous geographical distribution and can live in very diverse habitats. They are omnivorous, eating plants, animals, and carrion. Some coyotes live alone, others in mated pairs, and others in packs. Packs are an advantage when preying on larger mammals such as deer, or defending food resources, territory, and themselves.

Gray fox (*Urocyon cinereoargenteus*) are active at night and during twilight. Their prey includes various small mammals, birds and occasionally, a considerable amount of plant material such as berries (Ingles 1989).

Red fox (*Vulpes fulva*), an introduced species capable of causing serious problems for indigenous species of mammals and birds, are suspected of being present in the GND (C. Barr, pers. comm. 2005) but their presence is unconfirmed at this time.

Raccoon (*Procyon lotor*) are among the most adaptable of the carnivores. Raccoons can live comfortably in cities or rural and wilderness areas. Raccoons eat just about anything, finding food on the ground, in trees, streams, and ponds.

Long-tailed weasels (*Mustela frenata*), like many mammals in the GND, are secretive and identified mainly by tracks (Burton and Kutilek 1991). Kutilek et al. (1991), however, reported an incidental weasel sighting at the GOF. Long-tailed weasels are voracious predators, foraging day and night for small vertebrates, and scavenging for carrion when necessary (Ahlbron 2004a). Known prey include moles, deer mice, muskrats, rats, gophers, ground squirrels, rabbits, shrews, birds, eggs, and deer carrion (Ingles 1989).

Gray fox, horned owls, raptors, coyotes, bobcats, domestic dogs and cats, and rattlesnakes all prey on long-tailed weasels. Although they can live in a variety of habitats, population densities are low. Because of small populations sizes that have periodic fluctuations, long-tailed weasels are considered either endangered, threatened or a species of concern in several states and Canada, but not in California (Sheffield and Thomas 1997).

Both striped skunk (*Mephitis mephitis*) and spotted skunk (*Spilogale putorius*) occur in the GND. Both skunk species are primarily crepuscular to nocturnal, but spotted skunk may be active in the daytime (Jameson and Peeters 2004). Both species eat mainly insects but may consume small animals, carrion, and some vegetation. Great horned owls, coyotes, badgers, gray fox, and bobcats prey upon striped skunks (Ahlbron 2004b).

The bobcat (*Lynx rufus*) is the most widely distributed native cat in North America. They are mostly nocturnal predators; taking prey ranging in size from a mouse to a deer with rabbits and hares making up a large part of the bobcat's diet (Lariviere and Walton 1997; Smith 1980).

Mule deer (*Odocoileus hemionus*) live in small social groups of about three, except during the winter, when large groups may come together to feed. Mule deer are known to eat iceplant, which seeds remain viable after passing through their gut, making them a mechanism of the dispersal for this invasive weed (Au 2000).

The largest North American rodent, the American beaver (*Castor canadensis*) is common and widespread. In spring and summer, beaver prefer to eat grasses, leaves, and aquatic vegetation, such as tules, cattails (*Typha latifolia*; Entrix Inc. 1996; Kutilek et al. 1991; Smith et al. 1976), and pond lilies (*Nuphar polysepalum*; Smith et al. 1976). At Pismo Marsh (Smith, et al. 1976), Oceano Lagoon, and along the lower reaches of the Arroyo Grande Creek, arroyo willows provide a renewable resource for construction of dams and for food of the abundant beaver population (J. Blecha, pers. obs. 2004-2006).

Heermann's kangaroo rat (*Dipodomys heermanni*) has nine subspecies present in central California including the Morro Bay kangaroo rat (*D. heermanni morroensis*), a federal and state endangered species, that *does not occur* in the GND (Thelander and Crabtree 1994). Kangaroo rats in the GND feed mainly on grass seeds from soft chess (*Bromus mollis*) and foxtail brome (*Bromus rubens*; Dames & Moore 1979), and wild oats (*Avena fatua*; Entrix Inc. 1996). They supplement their diet with occasional insects (moths, beetles, grasshoppers) captured at night. Despite the wide range of the kangaroo rat diet, it is unknown if they feed upon introduced species such as European beachgrass (*Ammophila arenaria*) or veldt grass (*Ehrharta calycina*).

Dusky-footed woodrat (*Neotoma fuscipes*) build elaborate nests ('houses'), made out of sticks that can measure over a meter in height and width and may be used by many tens of generations. Woodrats eat leaves, flowers, nuts, and berries from a variety of plants including favorites coffeeberry (*Rhamnus californica*), poison-oak, blackberry, and roses (Jameson and Peeters 2004).

The riparian or San Joaquin Valley woodrat (*Neotoma fuscipes riparia*), which is federally endangered, does not occur in the GND.

California mouse (*Peromyscus californicus*) have been recently proposed the new common name of parasitic mouse for their habit of using nests of other rodents, primarily wood rats (Jameson and Peeters 2004). They are mainly nocturnal, with peak activity periods near dusk and dawn. They may take some insects but their main diet is a variety of leafy material including leafy green foliage, fruits, flowers and seeds of shrubs (Jameson and Peeters 2004).

Common muskrats (*Ondatra zibethica*) are highly successful, semi-aquatic rodents. Muskrats are mainly herbivorous, eating aquatic plants such as cattail and bulrush. They favor roots, but invertebrates (mollusks, crayfish) and vertebrates (turtles, fish) are also eaten (Willner et al. 1980; Brylski 2004). Muskrats are occasionally observed foraging in Oso Flaco Lake.

"Rabbits" (black-tailed jackrabbit, Audubon's cottontail and bush rabbit) are common and abundant in most habitats in the GND (Appendix E). They are known to eat a wide variety of plant material including forbs, grasses, and tender branches of shrubs and sagebrush (Jameson and Peeters 2004). Bush rabbit are known to eat *Dudleya* spp. (live forever) and various thistles (Jameson and Peeters 2004). Whether or not, and to what extent, if any, these 'rabbits' (one hare and two rabbits) are affected by invasive weed control methods used in the GND is unknown.

Although bats are commonly seen in the GND, no bat studies, collections, or authoritative observations have been conducted to date. Together, several studies (Smith et al. 1976, Dames & Moore 1979, Burton and Kutilek 1991, Entrix, Inc. 1996; UNOCAL 1999) report that 15 species of bats are likely to occur in the GND (Appendix

E-1). However, in a focused study of bats at Vandenberg Air Force Base (VAFB), Santa Barbara County, only10 bat species were identified on the base (Pierson et al. 2002). This study provides the best indication of the bats that may occur in the GND, since the northern-most portion of the VAFB study area is within a few miles of the southern most extent of the GND in Santa Barbara County. Pierson et al. (2002) is the primary source for information on bats presented here.

Paul Collins, curator at Santa Barbara Museum of Natural History and one of the principal authors of the VAFB study, suggested that all 10 bat species identified from VAFB can be reasonably expected to occur in the GND (P. Collins, pers. comm. Sept. 2004). These 10 bat species are shown in Table 7.2 with an asterisk (*). Of these, five are special-status species and are discussed in more detail in a following section. For those species not of special status, California myotis (*Myotis californicus*), Brazilian free-tail (*Tadarida brasiliensis*), and big brown bats (*Eptesicus fuscus*) were the three most widely distributed and frequently encountered species on VAFB (Pierson et al. 2002) and are common in most habitats throughout California (Burt and Grossenheider 1976). Hoary bat (*Lasiurus cinereus*) and silver-hair bat (*Lasionycteris noctivangans*), both reliant on riparian and wooded habitats, were rarely detected at VAFB. These latter two species are migratory bats and may be expected to pass over the dunes during their spring and fall migrations but are not expected to forage or roost in GND habitats (P. Collins, pers. comm. 2004

Bats in the GND can be expected to roost in trees, such as eucalyptus, caves and old buildings (Pierson et al. 2002).). P. Collins writes:

> "…There are few man-made structures in the Guadalupe Dunes that would provide possible roosting habitat for bats. You must keep in mind that bats will move some distance from suitable roosting habitat to suitable foraging habitat. *Eumops* (Western Mastiff Bat) can fly more than 40-50 miles from their daytime roost to forage at night. On VAFB we recorded Big Brown bats (*Eptesicus fuscus*) moving 2.5-3.0 miles from their day time roosts to forage over standing water and around a eucalyptus grove close to the coast. There are lots of man-made structures in the vicinity of Guadalupe and large trees can be found in this town, along the Santa Maria River, Orcutt Creek, and on the Nipomo Mesa. Bats probably use these locations for roosting and commute to suitable foraging habitat in the Guadalupe Dunes." (P. Collins, personal communication September 2004).

7.5 Potential effects to mammals from invasive plant species control methods

Of the methods used to control invasive plants in the GND, herbicides and controlled burns potentially impact mammals. However, in both cases, any overall impact is considered as negligible due to the small area affected by invasive weeds and weed treatment methods relative to the comparatively large areas of natural dune habitats.

Controlled burns

When controlled burns are used in the GND, they are restricted to a small area, containing mainly beach grass. Controlled burns are not expected to impact large mammals that can easily escape, unlike small rodents such as voles and mice where there may be some mortality (Higgins et al. 1989). The risk to smaller mammal species is unknown because their distribution and species composition in targeted burn areas (beach grass) is poorly understood.

Herbicides

Both herbicides used in the GND, glyphosate (Roundup ®) and fluazifop-p-butyl (Fusilade ®) are characterized as having ‘relatively low toxicity to birds and mammals’ and ‘slightly to practically nontoxic’ to mammals (Tu et al. 2001). Both herbicides are approved for use by various conservation organizations to control invasive species on their nature conservation sites including, The Nature Conservancy (Tu et al. 2001) and English Nature (Britt et al. 2003).

Roundup acts on a metabolic pathway in plants that is not present in animals. The risk of acute toxicity from glyphosate is very low; symptoms of poisoning are only seen at very high doses (in Tu et al. 2001). In most cases, changes in the diversity of small mammals following glyphosate treatments were within the limits of natural fluctuations and associated with the effects of a change in the structure and type of vegetation brought about by the herbicide (Sullivan and Sullivan 2003).

The greatest risk accompanying herbicide use is aerial spraying, herbicide drift, and over application of herbicide. No aerial spraying occurs in the GND and, due to specific application procedures and the relatively small amounts of herbicides used, herbicide drift or over-application have little to no impact on mammals in the GND.

Literature cited

Ahlbron, G. 2004a.

Ahlbron, G. 2004b.

Au, L. 2000.

Bekof, M. 1977.

Britt, C. et al. 2003.

Brylski, P. 2004.

Burt, W., and R. Grossenheider 1976.

Higgins, K. et al. 1989.

Ingles, L. 1989.

Jameson, E., and H. Peeters. 2004.

Lariviere, S. and L. Walton. 1997.

Pierson, E. et al. 2002.

Sheffield, S., and H.Thomas. 1997

Sullivan, T., and D. Sullivan. 2003.

Tu, M. et al. 2001.

Willner, G. et al. 1980.

7.6 Species accounts for confirmed special-status GND mammals

Below are species accounts for the ornate shrew, the only special-status mammalian species known to occur in the GND, and three mammalian species of local interest: black bear, American badger, and mountain lion.

Ornate shrew *Sorex ornatus*

Status

The ornate shrew, *Sorex ornatus*, is a complex assemblage of nine subspecies (Maldonado, Vila and Wayne 2001), of which four are recognized by the state as mammal species of special concern (CDF&G 2005): *S .o. salicornicus, relictus, willetti* and *sinuosus*. These subspecies have a restricted range and are thought to be threatened primarily due to destruction of wetlands and riparian habitats. Although the subspecies of the ornate shrews collected in the GND were not specified, elimination of those subspecies with known ranges that do not include the GND suggests that the subspecies most likely to occur in the GND is *Sorex ornatus ornatus* (Maldonado, Vila and Wayne 2001), which are not a special-status sub-species. The range of this shrew extends from the Kern River in the Sierra Nevada south into Baja California Norte, Mexico (Maldonado, Vila and Wayne 2001).

Habitat and occurrence within the GND

Several studies have documented the occurrence of ornate shrew in the GND (Smith, et al. 1976; Entrix Inc. 1996; Dames & Moore 1979). Shrews have been observed in foredune, dune swale, wetland, and riparian habitats. They may enter the drier dune areas to forage for insects at dusk and later in the night, but spend most of the time in the protected dense vegetation among wetland and riparian habitats. Kutilek et al. (1991) reported an unidentified shrew in a wetland habitat.

Habitat in other areas

Ornate shrews generally inhabit moist areas such as along streams and also brushy hillsides (Ingles 1965). They may climb trees and shrubs. Although mainly terrestrial, they may take to water (Norwalk 1991).

Present status within the GND

Ornate shrews have been reported to occur in the GND consistently over the period from the 1970's (Smith et al. 1976) into the 1990's (Entrix Inc. 1996).

Life history

Ornate shrews are active primarily during the day but may also be active at night, depending on the weather and season. During active times they move rapidly both over the ground and through shallow subsurface tunnels. Although active year-round and do not seem to become seasonally inactive, they may experience times of deep slumber (Norwalk 1991). These shrews are generally solitary. They rest in wood, shrubs, and shallow burrows. Migration is unknown and dispersal seems to be limited (Norwalk 1991)

Shrew diet consists of a variety of adult, larval and pupal insects, worms and other small invertebrates, although they will feed on vertebrates (carrion) and occasionally eat plant material (Norwalk 1991). Their home range is on the order of a few hundred meters, which they defend aggressively except during breeding (Norwalk 1991).

Ornate shrews live less than two years. Most breeding occurs in March and April. Gestation last about 21 days and liter size ranges between 4 to 6 young. Infrequently, females may produce a second liter. Most do not live to reproduce in the second year. Owls are a major predator.

Potential effects of invasive plant species control methods

Given their insectivorous diet and high metabolic rate, ornate shrews may be at a small, unknown risk from herbicide contamination if insects are directly sprayed by herbicides and then within a short time frame are consumed by shrews. This potential risk of contamination may be reduced somewhat when it is considered that, while the shrews are found in habitats with both veldt and European beach grass, their main habitat preference is in moist wetland areas where activities to control invasive plant species are less intensive compared to treatments in drier areas of the GND.

<u>Literature cited</u>

CDFG. 2004.

Ingles, L. 1965.

Maldonado, J., C. Vila, and R. Wayne. 2001.

Norwalk, R. 1991.

Black bear ***Ursus americanus***

<u>Status</u>

Black bears (*Ursus americanus*) are the only bear currently living in the wild in California. They are not considered a CDF&G special-status species (CDF&G 2004) but are here considered a species of local interest since they are the largest carnivores likely to be encountered in the GND. Bears also figure prominently in the local history of the GND, although the namesake of the Oso Flaco Lake bear was a California grizzly, not an American black bear.

California's black bear population has increased in recent years, observed in areas today where they were not seen 50 years ago. Between 25,000 and 30,000 black bears are now estimated to occupy 52,000 square miles in California (Ahlbron 2004d).

<u>Habitat and occurrence within the GND</u>

Incidental sightings of black bears have been made over the years in the GND. One such incident is documented as follows:

> "A black bear as spotted by visitors on July 4, 2002. The tracks were confirmed later by a State Parks ranger and myself. The tracks came from the Refuge out to the beach strand and up the beach into the Oceano Dunes SVRA. The bear was chased by visitors south into the Oso Flaco Natural Area." (Chris Barr, GND National Wildlife Refuge Manager, pers comm. 7 September 2004).

<u>Habitat in other areas</u>

Black bears are widespread, occurring from sea level to high mountain regions; however, they prefer forested and shrubby habitats. They will climb trees to escape danger and use forested areas as travel corridors. Black bears use cavities in trees, snags, stumps, and logs for denning (Ahlbron 2004d).

<u>Present status within the GND</u>

Black bears are expected to be present within GND habitats. They are well known to be tolerant of human presence and, in some areas of the state, to become obnoxious as camp raiders and beggars.

The name Oso Flaco comes from the 1769 Gaspar de Portola expedition's encounter with a thin grizzly bear, an Oso Flaco, - shot and eaten by his men while camping at the lake they named for the bear.

<u>Life history</u>

Classified as carnivores, black bears are actually omnivores. At least 75 percent of their diet consists of vegetable matter especially fruits, berries, nuts, acorns, grass, roots, twigs and leaves. Their diets also include honey, insects, insect larvae, fish, rodents, occasionally large mammals, and they are not averse to eating carrion (Norwalk 1991).

Black bears avoid the harsh weather in a condition termed 'winter-rest' where their body temperature drops about 10ºF with heart and respiration rates staying constant. They live off their stored fat. A diet of berries before winter-rest acts as a laxative to cleanse the digestive tract, then the bear eats pine needles, leaves and/or hair which form an anal plug.

Black bear cubs are born in late-January to mid-February while the sow is in her winter-rest. Weighing 1/2 pound, the cubs are blind and helpless; twins are common. They nurse and grow until she comes out of her den in the spring. At the end of their first year, they may weigh 50-60 pounds, but will grow to 200-500+ pounds.

<u>Potential effect of invasive plant control methods</u>

Black bears can be reasonably expected to be little effected, if any, by current invasive plant species control methods. They are likely to remain in riparian thickets during the day, areas little affected by control methods. In their foraging they may ingest animal material that has come into contact with herbicides but, as pointed out earlier, vertebrates are considered at little risk to toxicity by the herbicides currently used. Any potential effects ingestion of herbicide affected material is likely to be further reduced by their relatively large size compared to the amount of such material likely to be ingested.

<u>Subspecies</u>

Sixteen subspecies are reported. The two listed below occur in California and western North America.

U. a. altifrontalis – Pacific Northwest coast from central British Columbia through northern California and inland to the tip of northern Idaho and British Columbia.

U. a. californiensis – Central Valley of California, north through southern Oregon.

Literature cited

Ahlbron, G. 2004d.

CDFG. 2004b.

CDFG. 2004.

Norwalk, R. 1991.

American badger ***Taxidea taxus***

Status

In August 2003, the American badger (*Taxidea taxus*) was listed by the California Department of Fish and Game as a Species of Concern due to a reduction in range and abundance in several areas where they were formerly common (Grenfell, Parisi, and McGriff 2003). However, their distribution over the western two-thirds of the continental U.S. appears to be expanding eastward.

Habitat and occurrence within the GND

Badgers have been encountered in riparian habitats just east of Oso Flaco Lake, and one km north of the lake (Burton and Kutilek 1991).

Habitat in other areas

Historically, badgers are known to occur throughout California, except for the humid forested region in the extreme northwestern corner. They are more abundant in drier open, shrub, forest, or herbaceous habitats with friable soils (Ahlborn 2004c).

Present status within the GND

Badgers and their burrows have been observed in the GND since the early 1970s through the more recent studies in 1990s (Kutilek et al. 1991; Entrix, Inc. 1996) focused in the Guadalupe Oil Field, have not reported any badgers. Badgers have been reported in Black Lake Canyon by residents bordering the canyon (R. Belnap, pers. comm., March 2004).

Life history

Badgers look like short, shaggy, medium-sized dogs, powerfully built, with wedge-shaped bodies, a small head, and a short thick neck. Their name comes from the “badges” of black fur surrounded by white on their faces.

The primary food of badgers are fossorial (burrowing, digging) rodents, primarily ground squirrels and pocket gophers (Jameson and Peeters 2004) that they capture by excavating their burrows (Nowak 1991). Also eaten are toads, frogs, birds, snakes, insects, wasps, bees, and worms. Badgers can be active throughout the day but are primarily nocturnal. Adult badgers have few predators although coyotes may incidentally prey on them. Humans are the badgers' worst enemy, trapping and poisoning them.

Badgers are extremely solitary animals, except during the mating season. Typical population density is about five animals per square kilometer. Home ranges are on the order of 2 to 3 square kilometers to which they show a strong attachment. They spend most of the winter in a den, sleeping for a day or so at a time, rousing briefly, and then sleeping again. Badgers have scent glands similar to a skunk's and they will discharge (but not spray) a musk-like odor when annoyed or to mark their territories.

<u>Potential effect of invasive plant control methods</u>

Badgers are likely not impacted, if at all, by current invasive plant species control methods. In their foraging, they may ingest animal material that has encountered herbicides but, as pointed out earlier, vertebrates are considered at little risk to toxicity by the herbicides currently used. Any potential effects ingestion of herbicide impacted material is likely to be further reduced by their relatively large size compared to the amount of such material likely to be ingested.

<u>Subspecies</u>

T.t. jeffersonii [*sulcata, neglecta, Montana* are synonyms] inhabits the western coastal states of Canada and the US, and adjoining states and would be the likely subspecies found in the GND (Long 1973).

<u>Literature cited</u>

Ahlbron, G. 2004c.

Grenfell, W., M. Parisi, and D. McGriff. 2003.

Jameson, E. and H. Peeters. 2004.

Long, C. 1973.

Mountain lion — *Puma concolor*

<u>Status</u>

Mountain lion are presented here as a species of local interest. Over time, the status of the mountain lion in California evolved from that of ‘bountied predator’ between 1907 and 1963 to “game mammal” in 1969, to “special protected mammal” in 1990. The change in legal status reflected growing public appreciation and concern for mountain lions. Recent studies by the California Department of Fish and Game, suggest that 2,500-5,000, or more, mountain lions currently live in California. Numbers appear to be increasing (Ahlbron 2004e). However, there are indications that mountain lion activity, such as depredation and attacks on people, peaked in 1996, then decreased somewhat, and have remained stable for the past several years (CDFG 2004e).

Habitat and occurrence within the GND

Mountain lion have been reported anecdotally along the Santa Maria River in grassland and shrubby areas used for cattle grazing. Chris Barr (USFWS, personal communication) has received reports of mountain lion in the Solomon Creek area east of the Rancho Guadalupe Dunes County Park. Solomon Creek crosses under West Main Street near the Gordon Sand facility.

Habitat in other areas

Mountain lions are widespread, but not commonly observed, permanent residents, ranging from sea level to alpine meadows. They survive, and perhaps prosper, in several large California cities (Jameson and Jeeters 2004). Mountain lions are most abundant in riparian areas and brushy habitats.

Present status within the GND

Only incidental sightings of mountain lions and their tracks have been made in the GND. One such incident is documented in the following quotation:

> “Mountain lion tracks and occasional sighting(s) by visitors have been reported along the Santa Maria River. The location of most sightings [are] where Solomon creek enters the Santa Maria River on private lands where cattle are being run” (Chris Barr, GND National Wildlife Refuge Manager, pers comm. 7 September 2004).

On April 30, 2005, a two-year-old male mountain lion was shot and killed at a beach side campground in Pismo Beach (Telegram-Tribune, 1 May 2005). The mountain lion walked into an RV park around 0800 hrs and apparently came from somewhere in the nearby dune habitat or riparian area. From this incident, it seems that mountain lions are currently present in dune habitat, at some unknown population density.

Life history

Mountain lions live solitary lives at low population densities and, although they usually avoid humans, about four attacks are reported annually in the United States and Canada. They usually hunt at night, either stalking their prey or waiting in ambush. They rarely bed down in the same place two days in a row unless they are watching young or consuming a large kill. Their prey is mainly deer but they also take rabbits, porcupines, bobcats, coyotes, beavers, opossums, skunks, and even other cougars. It is estimated that mountain lions require anywhere from one deer every 16 days, for a single adult, to one deer every three days for a female with large cubs. In urban areas, they may specialize on domestic cats (Jameson and Peeters 2004).

Potential effect of invasive plant control methods

Effects to mountain lions from invasive plant control methods as currently practiced in the GND are considered to be essentially negligible, for reasons similar to that for black bears and badgers, the two other large GND carnivores.

Subspecies

Thirty subspecies are recognized in the Americas from Canada through the USA, Mexico, Central America and south into South America.

Other common names

Florida panther, Cougar, puma, catamount, Florida panther, panther, painter, lion, Mexican lion, mountain demon, mountain devil, mountain screamer, brown tiger, red tiger, deer killer, Indian devil, king cat, sneak cat, and varmint.

Literature cited

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7.7 Species accounts for unconfirmed mammals

Chiroptera – Bats

No studies, collections, or authoritative observations of bats have been conducted at the GND. However, based on information presented in Pierson et al. (2002) on the bats of Vandenberg Air Force Base and personal communication from P. Collins, Santa Barbara Museum of Natural History, five special-status bat species may be reasonably expected to occur in the GND (Table 7-2). Their occurrence at VAFB is an indication of what their occurrence in the GND can be expected to be. Yuma myotis (*Myotis yumanensis*), normally one of the most commonly encountered bats in California, particularly at lower elevations, was not frequently encountered at VAFB, due perhaps to inadequate roosting habitat. Pallid bats (*Antrozonus pallidus*), Townsend’s big-eared bat (*Corynorhinus townsendii*), and the red bat (*Lasiurus blossevilli*) were uncommon, while Western mastiff bats (*Eumops perotis*) were rare on the base (from Pierson et al. 2002). Species descriptions are given below for these five species. A majority of the information presented for these species is from Pierson et al. (2002).

Potential effects of invasive plant control methods

All five of the special status bat species expected to be present in the GND, with the exception of the pallid bat, feed on flying insects. As explained previously, most flying insects, and especially those flying during crepuscular or nocturnal hours, the principal times when bats forage, can be reasonably expected to not have come into contact with treatment herbicides or else they probably could not fly due to wetted or sticky wings. Pallid bats, on the other hand, feed on insects on the ground and on foliage and may have an increased potential to ingest insect prey that inadvertently come into contact with herbicides. However, the herbicides used in the GND show little toxicity to vertebrates, as explained previously, with little, if any, potentially harmful effects to the bats.

The primary factory affecting bat populations are loss of roosting habitat, pesticides and, to a lesser extent, loss of foraging habitat (www.californiabats.com).

Pallid bat ***Antrozonus pallidus***

Status

The California Department of Fish and Game lists pallid bats (*Antrozonus pallidus*) as a mammal Species of Special Concern (CDF&G 2004) and the U.S Forest Service Region 5 (Pacific Southwest) lists them as a Sensitive Species. Pallid bats are at risk due to pesticide use and disturbance or destruction of roost sites in old buildings. Bat tree roost sites are dwindling due to agricultural conversion and building encroachment

Habitat and occurrence within the GND

Pallid bats have not been documented as occurring the GND. In their reconnaissance surveys in the dunes, Smith et al. (1976) and Entrix, Inc. (1996) list pallid bats as probable residents or visitors, probably found in most GND habitats except the foredunes. However, P. Collins (pers. comm. 2004) states that pallid bats are expected to occur in the more wooded areas of the GND (i.e. riparian and oak woodlands), and to forage and occasionally roost in eucalyptus woodlands in the dunes.

Habitat in other areas

At VAFB, pallid bats were highly reliant on the limited cave habitats and were associated with oak woodland, coastal sage, and grassland habitats. Pallid bats were also detected in eucalyptus stands near riparian drainages and adjacent to ponds and wetlands (Pierson et al. 2002)

Present status within the GND

There are no confirmed sightings of pallid bats in the GND.

Because of bat mobility and the close proximity between VAFB and the GND, it is highly likely that pallid bats occur in habitats in the GND and Black Lake Canyon similar to those at VAFB.

Life history

Pallid bats are among the larger bats with long-ears, a pig-like snout, and a distinctive skunk-like odor.

They are colonial with a typical colony of 30-70 animals and up to several hundred in larger colonies. Maternity colonies form in the spring and are found in various natural and man-made features including old buildings, under bridges, caves, mines, and tree hollows. Pallid bats are sensitive to disturbance and generally retreat into crevices if disturbed. They are not known to migrate and probably spend the winter hibernating close to their summer roosts.

The primary prey of pallid bats are large flightless arthropods such as cicadas, katydids, and sphingid [hummingbird] moths, caught on the ground or gleaned off vegetation (Pierson et al. 2002). Scorpions, Jerusalem crickets, and long-horned beetles have also been observed in pallid bat guano droppings (Burt and Grossenheider 1976).

Distribution / Collections

Pierson et al. (2002) documented 301 museum records of *A. pallidus* in 45 locations within the three counties of San Luis Obispo (22), Santa Barbara (19) and Ventura (4). The majority of specimens are from Santa Barbara County (n = 132). Specimens have been collected near sea level at Morro Bay.

Literature cited

Burt, W., and R.P. Grossenheider. 1976.

CDFG. 2004. (California Department of Fish and Game).

Pierson, E., et al. 2002.

Townsend's big-eared bat *Corynorhinus townsendii*

Status

California Department of Fish and Game recognizes Townsend's big-eared bat (*Corynorhinus townsendii*) as a mammal Species of Special Concern (CDF&G 2004) and the U.S. Forest Service Region 5 (Pacific Southwest) lists them as a Sensitive Species.

Townsend's big-eared bats are at risk due to disturbance or destruction of roost sites. They are very sensitive and will abandon roosts after human visitation (Newell 2002). As many caves become impacted by recreational caving and renewed mining in historic areas, these bats have come to depend more upon old buildings as roosts. Pierson et al. (2002) recommends gating the entrances of roosting caves to protect the species.

Habitat and occurrence within the GND

The occurrence of Townsend's big-eared bats has not been documented in the GND. In their reconnaissance surveys in the GND, Smith et al. (1976) and Entrix, Inc. (1996) list Townsend's big-eared bats as probable residents or visitors to the GND. P. Collins (pers. comm. 2004) considers their presence likely in more wooded areas of the GND (i.e. riparian and oak woodlands and roosting in eucalyptus trees.

Habitat in other areas

In California, *C. townsendii* ranges widely in a variety of habitats in deserts, coastal scrub and montane forests. Their populations are concentrated in areas offering caves or mines for roost sites.

At VAFB, Pierson et al. (2002) found Townsend's big-eared bats to be year round residents but highly reliant on the limited cave habitat or buildings as roost sites. Most roost sites were located near drainages or canyons associated with oak habitats. Townsend's big-eared bats were also detected in eucalyptus stands. Two radio-tagged *C. townsendii* were located in eucalyptus trees and observed for the first time for this species to be roosting on open tree limbs.

Present status within the GND

There are no confirmed sightings of Townsend's big-eared bats in the GND.

Life history

C. townsendii was, at one time, the most commonly found bat in natural caves of California. Currently along the California coast, most known roosts are in buildings and mine tunnels although they are still found in caves. Unlike many species that seek refuge in crevices, *C. townsendii* form highly visible clusters on open surfaces (cave domes or ceilings of old barns), which makes them vulnerable to disturbance. If disturbed for more than a few seconds they will leave the roost (Newell 2002).

Townsend's big-eared bats feed primarily on small moths and other flying insects that are captured in the proximity to vegetation or taken in the air. They are consistently found associated with creek beds where they feed along the riparian corridors.

Distribution / Collections

Based on review of museum records, most *C. townsendii* have been collected in Santa Barbara County from one colony on Santa Cruz Island (Pierson et al. 2002). A few have been collect near the coast at San Simeon and Shell Beach in San Luis Obispo County.

Subspecies

In the western US, some taxonomists distinguish two subspecies: *C. townsendii townsendii* and *C. townsendii pallescens.* In the east, two other subspecies *C*.

townsendii virginianus and *C t. ingens* are listed by the US Fish and Wildlife Service as federally endangered.

Recent synonyms

Originally classified as *Corynorhinus rafinesquei* and commonly called Lump-nosed bat or Western big-eared bat (Burt and Grossenheider 1976), Townsend's big-eared bats were re-classified as *Plecotus townsendii* until a recent revision back to the genus *Corynorhinus* (Newell 2002).

Literature cited

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CDFG. 2004. (California Department of Fish and Game).

Jameson, E. and H. Peeters. 2004.

Newell, T. 2002.

Pierson, E., et al. 2002.

Western red bat *Lasiurus blossevillii*

Status

Western red bats (*Lasiurus blossevillii*) are listed by the U.S. Forest Service Region 5 (Pacific Southwest) as a Sensitive Species and are proposed as a mammal Species of Special Concern by the California Department of Fish and Game (CDF&G 2004). Pesticides used in fruit orchards constitute reduce potential insect prey for these bats that often forage in orchards.

Habitat and occurrence within the GND

Red bats have not been documented as occurring the GND. In their GND surveys, Smith et al. (1976) and Entrix, Inc. (1996) list red bats as probable residents or visitors to the dunes. P. Collins (pers. comm. 2004) believes that red bats are likely to occur in the GND as an uncommon to rare, spring and fall migrant. If present, red bats would be in riparian habitats along the Santa Maria River, around the lakes at the back of the dunes, and may occasionally roost in eucalyptus woodlands on the Nipomo Mesa.

Habitat in other areas

Pierson et al. (2002) report that, at VAFB, red bats were highly reliant on the riparian habitat, particularly willow and cottonwood trees. They roost in riparian areas, under leaves, and in trees within 50 m of drainages. They are also known to occur in and around deciduous trees, frequently orchards (Jameson and Peeters 2004).

Present status within the GND

There are no confirmed sightings of red bats in the GND.

Riparian habitats at VAFB where Pierson et al. (2002) detected red bats are also found in the GND. Because of this bats' mobility and the close proximity between VAFB and GND, it is highly likely that red bats occur in these same habitats at the GND and Black Lake Canyon.

Life history

Red bats are wide ranging over North and South America. In winter, populations are concentrated along the coast of central and southern California. Red bats are insectivorous, consuming insects, commonly moths but also taking terrestrial insects (Jameson and Peeters 2004), while flying at both canopy height and low over the ground.

Recent synonyms

Until 1982, red bats in western US were considered a subspecies of *L. borealis* (Eastern red bat) and were known as *L. b. teliotis*. They are now recognized as a separate species after two recent phylogenic studies (Pierson et al. 2002).

Literature cited

CDFG. 2004. (California Department of Fish and Game).

Jameson, E. and H. Peeters. 2004.

Pierson, E., et al. 2002.

Yuma myotis ***Myotis yumanensis***

Status

Yuma myotis, *Myotis yumanensis*, is designated by the BLM as a sensitive species.

Habitat and occurrence within the GND

Yuma myotis (*Myotis yumanensis*) have not been documented as occurring the GND. In their GND surveys, Smith et al. (1976), Dames & Moore (1976) and Entrix, Inc. (1996) list Yuma myotis as probable residents or visitors to the dunes. P. Collins (pers. comm. 2004) expects Yuma myotis to forage over open water at the mouth of the Santa Maria River and over the surface of ponds and lakes found along the back side of the dunes (Oso Flaco Lake and Black Lake).

<u>Habitat in other areas</u>

Yuma myotis bats are highly associated with aquatic habitats. They are frequently found near man-made structures. They will roost in caves, mines, abandoned swallow nests, in hollows of trees and under the flaking bark of large dead trees. Jameson and Peeters (2004) state they are common in wooded canyon bottoms and deserts. At VAFB, Yuma myotis were found exclusively in man-made structures. Feeding activity concentrated around water sources (Pierson et al. 2002).

<u>Present status within the GND</u>

There are no confirmed sightings of Yuma myotis in the GND.

<u>Life history</u>

Yuma myotis are wide ranging over western North America. They feed primarily on small aquatic insects especially small moths, beetles, midges, mayflies, and caddis flies (Jameson and Peeters 2004). Yuma myotis are also known to forage over fields and orchards where they prey primarily on moths.

<u>Literature cited</u>

Jameson, E. and H. Peeters. 2004.

Pierson, E., et al. 2002.

Western mastiff bat ***Eumops perotis***

<u>Status</u>

Western mastiff bats (*Eumops perotis*) are a mammal Species of Special Concern by the California Department of Fish and Game (CDF&G 2004) due to impacts that have reduced roosting and foraging habitats. Pesticides may constitute a threat by reducing insect prey; pest control operations have reduced their numbers in the Los Angeles basin.

<u>Habitat and occurrence within the GND</u>

Western mastiff bats have not been documented as occurring the GND. In their GND surveys, UNOCAL (1999) and Entrix, Inc. (1996) list Western mastiff bat as rare visitors to the GND. P. Collins (pers. comm. 2004) expects western mastiff bats to be a rare transient to the GND since the nearest suitable roosting habitat for this species occurs more than 20 miles inland along the Cuyama and Sisquoc Rivers; they are known to fly more than 40-50 miles from their day time roost to forage at night.

<u>Habitat in other areas</u>

Western mastiff bats were rarely detected at VAFB, where they were only detected acoustically (Pierson et al. 2002). Natural roosts are among exfoliations in rock outcrops, but they also are found in cracks in buildings.

<u>Present status within the GND</u>

There are no confirmed sightings of Western mastiff bat in the GND. Because of the high mobility of this bat and the close distances between VAFB and GND, it is likely that Western mastiff bats occur at the GND.

Western mastiff bats have been detected acoustically at two sites in Camp Roberts in northern San Luis Obispo County.

<u>Life history</u>

Western mastiff bat is the largest bat found in California. They are insectivorous, taking moths while flying high above the ground (up to 1,000 ft.) but are also known to take bees, wasps, cicadas, and crickets. Their foraging range is extensive, reaching to over 15 miles from their roosting site.

<u>Subspecies</u>

In California, western mastiff bats, *Eumops perotis californicus*, are considered a subspecies separated from two South American subspecies.

<u>Literature cited</u>

CDFG. 2004. (California Department of Fish and Game).

Pierson, E., et al. 2002.

Conclusions and Recommendations

The following conclusions and recommendations are divided into several sections related to the major taxonomic groups and general recommendations that apply to all faunal groups.

General

Access into the GND areas for biological research is very limited. Current vehicular access points include the Pismo State Beach campgrounds, the Oceano Dunes SVRA, Oso Flaco Lake, Black Lake, the Chevron Guadalupe Remediation Site, and the Guadalupe Dunes County Park in Santa Barbara County. Opportunities for researchers interested in collecting or studying plants or animals for several days, and who have equipment not easily transported over large expanses of sand, are limited to areas nearby the campgrounds or in other areas populated by 2.1 million visitors annually. There should be an establishment of a field research station at some distance from human disturbance, but accessible by vehicle, where researchers could spend a few days with their equipment and related supplies.

Invasive plant species, herbicide and pesticide drift, and water quality are some of the most known, significant impacts to animal species in the GND. Another impact is the lack of information concerning GND animal species. This report covered which species are known or suspected to occur in the GND, however, the population distribution, size, and stability, and habitat quality (especially water regimes which are essential to many species) are unknown. Most of the data contained in this report is from information obtained decades earlier. If these species are still in the GND or if new species, especially subspecies occur, is unknown at this time. There is a need for GND wide animal species surveys and at a minimum the distribution and abundance should be elucidated. Once this information is known, then possible detrimental impacts (such as poor water quality) can be improved. This report is a first step in saving the species of the GND. More species specific and current information is the next step in this goal.

The relationship of fauna and invasive plant species is not well understood. Studies on how any of the invasive plants are used by the various animals as food or shelter would be of value in the future when, perhaps, other more widespread and aggressive plant control methods are used (e.g., aerial spraying of herbicides, or large scale mechanical removals). In addition, how invasive plants are detrimental to native species.

Invertebrates

Many of the endemic and species of special concern invertebrate species have not been recorded since the middle 1970’s. An effort should be made to search for these species and document their occurrence and abundance. These species include the Oso

Flaco flightless moth, the white sand-bear scarab beetle, Schlingers robber fly, the Oso Flaco patch butterfly, Rude's longhorn beetle, and the elegant *Lithariapteryx* moth.

Focused collections of various insect groups are necessary to fill in the large gaps in our understanding of what species are there. For example, beetles are currently under-represented in GND collections, based on comparisons with the known beetle fauna of similar habitats.

Insects are among the most important pollinators. Almost nothing is known about what insects pollinate the special-status plant species in the GND, or other information of their life history; knowledge that may be important for the long term survival of these plants.

Fishes

Invasive plant species, herbicide and pesticide drift, and water quality are some of the most known, significant impacts to animal species in the GND. Another impact is the lack of information concerning GND animal species and other possible impacts. This report covered which species are known or suspected to occur in the GND, however, the population distribution, size, and stability, and habitat quality (especially water regimes which are essential to many species) are unknown. Most of the data contained in this report is from information obtained decades earlier. If these species are still in the GND or if new species, especially subspecies occur, is unknown at this time. There is a need for GND wide animal species surveys and at a minimum the distribution and abundance should be elucidated. Once this information is known, then possible detrimental impacts (such as poor water quality) can be improved. This report is a first step in saving the species of the GND. More species specific and current information is the next step in this goal.
Of particular interest are the two federally listed species, steelhead trout, and tidewater goby. The role of introduced fish species in competition with these sensitive native species is unknown.

Amphibians

Systematic studies of all GND wetland habitats may produce other species or subspecies of amphibians, some of which may be special-status.

Control of bullfrogs, a known predator of California red-legged frogs, may benefit them and other species taken as prey by this introduced species.

Reptiles

Many of the reptiles collected in the GND were collected years ago. Since that time, many of the species have been divided into subspecies or races, some of which are special-status species.

Mammals

The bat fauna of the GND should be documented by a study similar to that recently completed on nearby Vandenberg Air Force Base. Five special status bat species are suspected of occurring in GND based on their occurrence in similar VAFB habitats.

Birds

For the most part, the bird fauna of the GND appears to be reasonably well known and documented. However, in many instances, while it is known that a particular species occurs in the GND at a place easily accessible by birders, it is unknown whether they are more widespread throughout other appropriate (for the species) GND habitats. Easier access to more interior areas of the GND could produce more information
.

In a situation similar to that for the reptiles, several bird species are known from the GND but the subspecies, which may be special-status, are not recorded. Careful observation by ornithologists is required to make these identifications, which may have management implications.

Other Marine Animals

There are no specific recommendations other than to make a record of the pinnipeds (seals and sea lions) that haul out on secluded areas of the beach. It is possible that southern elephant seals will make use of some of the more remote areas to establish

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APPENDIX A

Invertebrate Taxa and Source Documents

Phylum / Class / Order	*SCIENTIFIC NAME*	COMMON NAME	REFERENCE SOURCES
Porifera		**Sponges**	
	Spongillidae	Freshwater sponge	9
Cnidaria		**Jellies, anemones, corals**	
	Hydra sp.	Hydra (polyp only, no medusa)	1
Platyhelminthes		**Flatworms**	
	Dugesia sp.	Flatworm	1
Rotifera		**Rotifers**	
	Asplancha sp.	Rotifer	1
	Keratella sp.	Rotifer	1
Mollusca		**Clams, snails**	
Gastropoda		Snails	
	Helix sp.	Brown snail	5
	Helminthoglypta fieldi	Shoulderband snail	5
	Helminthoglypta umbilicata	Big Sur shoulderband snail	20
	Lymnaea sp.	Freshwater snail	1
	Nearctula sp.	Land snail	20
	Physa sp.	Freshwater snail	1,5
	Helisoma sp.	Pond snail	1,9
	Sterkia sp.	Land snail	20
	Tyronia imitator	California brackishwater snail	3,27
	Planorbidae	Freshwater ramshorn snail	10
	Physidae	Freshwater snail	10
Suborder Pulmonata		Snail	10
Annelida		**Worms, leeches**	
Oligochaeta		Earth (and aquatic) worms	10
	Euilyodrilus bavaricus	Tubificid oligochaete	1
Hirudinea	unidentified sp.	leech	1
Arthropoda		**Crustaceans, insects, spiders,**	
Crustacea		**crabs, shrimp, lobster, etc.**	
	Anisogammarus spp.	amphipod	9
	Ceropdaphnia sp.	cladoceran	1
	Corophium spinicorne	amphipod	9
	Cyclops sp.	copepod	1
	Daphnia pulex	cladoceran	1
	Diaptomus sp.	copepod	1
	Hyatella azteca	amphipod	1
	Pleuroxus sp.	cladoceran	1
	Sphaeromatidae	isopod	9,10
	Daphnidae	water flea	10
Cyclopoida		Cyclopoid copepod	9,10
Mysidacea		Opossum shrimp	9,10
Subclass Ostracoda		Ostracod	1
	Cyprididae	ostracod	9,10
Arachnida		**Spiders, mites, ticks, scorpions, harvestmen**	23
	Aptostichus sp.	Coastal trapdoor spider	50
	Dermacentor occidentalis	Pacific coast tick	43
	Dermacentor viriabilis	American dog tick	43
	Ixodes pacificus	Western black legged tick	43

Otobius megnini	Spinose ear tick	43
Infraorder Trombidiformes	water mites (or chiggers)	10
Diplopoda	**Millipedes**	23
Chilopoda	**Centipedes**	23
Insecta		
Thysanura	**Silvertails**	
Allocrotelsa spinulata	Spiny silvertail	23
Collembola	**Springtails**	23
Ephemeroptera	**Mayflies**	
Baetis sp.	Mayfly	9
Callibaetis sp.	Mayfly	9
Baetidae		10
Odonata	**Dragonflies, damsel flies**	
Anax sp.	Dragonfly, darner	9
Enallagama sp.	Damselfly	9
Ischnura sp.	Damselfly	9
Sympterum sp.	Dragonfly, skimmer	9
Zoniagrion sp.	Damselfly	9
Aeshnidae	Dragonfly	10
Coenagrionidae	Damsel fly	1,10
Libellulidae	Dragonfly	10
Orthoptera	**Crickets, grasshoppers**	
Ammopelmatus muwu	Pt. Conception Jerusalem cricket	29
Arphia conspersa	Yellow winged grasshopper	23
Camnula pellucida	Clear winged grasshopper	23
Ceuthophilus sp.	Dark-headed camel cricket	23
Macrobaenetes sp.	Sand treader cricket	22
Rhachocnemis validus	Sand treader cricket	23
Trimeritropis pogonata	Sand colored grasshopper	13
Stenopelmatidae	Undescribed Jerusalem cricket	29
Dermaptera	**Earwigs**	
Forficula auricularia	Earwig	41
Dictyoptera	**Mantids, roaches**	
Arenivaga sp.	Sand roach	23
Parcoblatta Americana	Western wood roach	23
Hemiptera	**Bugs**	
Ambrysus sp.	Creeping water bug	9
Apiomerus californicus	California assassin bug	23
Belostoma bakeri	Giant water bug	9
Buenoa scimitar	Backswimmer	9
Cenocorixa blaisdelli	Waterboatman	9
Corisella decolor	Waterboatman	9
Corisella inscripta	Waterboatman	9
Gerris remigis	Water strider	9
Hesperocorixa laevigata	Waterboatman	9
Largus cinctus	Red bug	23
Merragata herbroides	Velvet water bug	9
Microvelia beameri	Broad-shouldered water strider	9
Notonecta kirbyi	Backswimmer	9
Notonecta shooterii	Backswimmer	9
Notonecta sp	Backswimmer	1
Belostomatidae	Giant water bug	10

Corixidae	Waterboatman	1
Notonectidae	Backswimmer	10
Thysanoptera	**Thrips**	
Anaphothrips secticornis	Thrip	35
Anaphothrips stanfordii	Thrip	35
Limothrips angulicornis	Thrip	35
Rhipidothrips gratiosus	Thrip	35
Neruoptera	**Lacewings, antlions**	
Brachynemurus ferox	Ant lion	23
Hemerobius pacificus	Brown lacewing	23
Coleoptera	**Beetles**	
Acilius semisulcatus	Predaceous diving beetle	9
Agabus sp.	Predaceous diving beetle	9
Anacaena sp.	Water scavenger beetle	9
Apion proclive	Weevil	23
Berosus sp.	Water scavenger beetle	9
Calathus ruficollis	Ground beetle	23
Cicindela oregona	Oregon tiger beetle	23
Coelocnemis magna	Ground beetle	23
Coelus ciliatus	Subterranean sand dune beetle	18,23
Coelus globosus	Globose dune beetle	24,25
Coniontis affinis	Ground beetle	23
Coniontis eschscholtzii	Ground beetle	13
Coniontis subpubescens	Ground beetle	23
Copidita quadrimaculata	False blister beetle	23
Cratidus osculans	Woolly ground beetle	23
Creophilus maxillosus	Hairy rove beetle	23
Cyphon sp.	Marsh beetle	9
Dermestes vulpinus	Skin beetle	23
Diabrotica undecimpunctata	Western spotted cucumber beetle	23
Dytiscus marginicollis	Predaceous diving beetle	9
Elater lecontei	Click beetle	19
Eleodes camphiodorus nigropilosa	Darkling ground beetle	23
Eelodes clavicornis	Darkling ground beetle	13,23
Eleodes gigntea	Gigantic eleodes	23
Eleodes laticollis	Darkling ground beetle	23
Eleodes marginata	Darkling ground beetle	23
Eleodes planatus	Darkling ground beetle	23
Ellychnia californica	California glow worm	23
Enochrus sp.	Water scavenger beetle	9
Epantius obscurus	Darkling ground beetle	23
Epicanta puncticullis	Blister beetle	23
Eusattus difficilis	Darkling ground beetle	23
Gyrinus consobrinus	Whirlygig beetle	9
Halicta bimarginata	Leaf beetle	23
Haliplus sp.	Crawling water beetle	1
Helichus sp. 1	Long-toed water beetle	9
Helichus sp 2	Long-toed water beetle	9
Hoplia callipyge	Hoplia beetle	19
Hydroporus spp.	Predaceous diving beetle	9
Hygrotus sp. 1	Predaceous diving beetle	9
Hygrotus sp. 2	Predaceous diving beetle	9

Laccophilus maculosus	Predaceous diving beetle	9
Lichnanthe albipilosa *	White sand bear scarab beetle	2,19,27
Limonius sp.	Click beetle	23
Lytta moerens	Blister beetle	23
Lytta sp.	Blister beetle	23
Melanotus obesus	Click beetle	13
Microphotus angustus	Pink glow worm	23
Necrophorus nigrita	Black carrion beetle	23
Necrophorus pustulatus	Carrion beetle	23
Necydalis rudei	Rude's longhorn beetle	13,19
Nyctoporis casinata	Darkling ground beetle	23
Ochthebius sp.	Minute moss beetle	9
Omaseus corwinus	Carabid ground beetle	23
Paracymus spp.	Water scavenger beetle	9
Polyphylla decemlineata	Scarab beetle	23
Psammodius doyeni	Doyen's scarab beetle	13
Pterostichus californicus	Woodland ground beetle	23
Rhagodera tuberculata	Darkling ground beetle	23
Rhantus anisonychus	Predaceous diving beetle	9
Rhantus sp. 1	Predaceous diving beetle	9
Saprinus lugens	Hister beetle	23
Scerica sp.	Scarab beetle	23
Sphenophorus sp.	Weevil	23
Trigonoscuta pismoensis	Weevil	28
Trigonoscuta sp.	Weevil	23
Trirhabda sp.	Coyote bush beetle	49
Tropisternus sp.	Water scavenger beetles	9
Xanthogaleruca luteola	Elm leaf beetle	23
Cantharidae	Solider beetles	23
Carabidae	Ground beetles	23
Chrysomelidae	Leaf beetles	23
Curculionidae	Weevils	23
Coccinellidae	Ladybird beetles	23
Dermestidae	Skin beetles	23
Dystiscidae	Predaceous diving beetles	10
Elateridae	Click beetle	23
Histeridae	Hister beetles	23
Lampyridae	Firefly Beetles	23
Meloidae	Blister beetles	23
Oedemeridae	False blister beetles	23
Scarabaeidae	Scarab beetles	23
Silphidae	Carrion beetles	23
Staphylinidae	Rove beetles	23
Tenebrionidae	Darkling ground beetles	23
Hymenoptera	**Bees, wasps, ants**	
Ammophila sp.	Wasp	23
Andrena (Leucandrena) barbilabris	Bee	7
Andrena (Parandrena) concinnula	Bee	7
Anoplius (Anoplius) imbellis	Spider wasp	47
Anoplius (Anoplius) toluca	Spider wasp	47
Anoplius (Pompilliuus) clystera	Spider wasp	47

Anthidium palliventre	Bee	39
Aphorinellus taeniatus	Spider wasp	47
Aphorinellus fasciatus	Spider wasp	47
Apis melifera	Honey bee	7,23
Bembix americana comata	Sand wasp	31,42
Bembix sp.	Sand digger wasp	23
Bombus fervidus	Golden bumblebee	23
Certina sp.	Carpenter bee	7
Camponotus sp.	Ant	23
Chalybion sp.	Wasp	23
Clypeadon californicus	sphecid wasp	44
Dialictus sp.	Sweat bee	7
Episyron biguttatus californicus	Sphecid wasp	47
Episyron quinquenotatus hurdi	Sphecid wasp	47
Evagetes hyacinthinus	Sphecid wasp	47
Evagetes ingenuus	Sphecid wasp	47
Evagetes padrinus padrinus	Sphecid wasp	47
Evagetes subangularus	Sphecid wasp	47
Eucerceris provancheri	Sphecid wasp	47
Hylaeus sp.	Masked bee	7
Lasioglossum pavonotum	Bee	7
Philanthus pacificus	Sphecid wasp	47
Pompilus (Ammosphex) angularis	Spider wasp	47
Pompilus (Ammosphex) anomolus	Spider wasp	47
Pompilus (Ammosphex) parvulus	Spider wasp	47
Pompilus (Arachnospila) scelestus	Spider wasp	47
Sphecodes sp.	Cuckoo bee	7
Andrenidae	Burrowing bees	23
Braconidae	Braconids	23
Cephidae	Stem sawfly	23
Chalcidoidea	Parasitic wasp	23
Formicidae	Ants	23
Halictidae	Sweat bee	23
Ichneumonidae	Ichenumon wasp	23
Mutillidae	Velvet ants	23
Pompilidae	Spider wasps	23
Tenthredinidae	Common sawfly	23
Vespidae	Hornets / yellowjackets	23
Lepidoptera	**Moths, butterflies**	
Alcathae pacificus	Pacific willow moth	23
Anthocharis sara	Orange-tip	23
Aracgnis picta	Painted tiger moth	25
Areniscythris bachypteris *	Pismo Dunes grasshopper moth	13,17
Argyrotaenia franciscana	Microlepidoptera	13
Argyrotaenia sp.	Microlepidoptera	13,15
Cholosyne gabbi gabbi	Gabb's checkerspot	30
Chlosyne leanira osoflaco OR	Oso Flaco patch butterfly	27
Thessalia leanira osoflaco		?
Coenonympha californica	California ringlet	23
Danus plexippus	Monarch butterfly	3,
Eucosoma hennei	Henne’s eucosoman moth	26
Euphydryas chalcedona	Checkerspot	23

	Eyphydryas editha editha	Edith's checkerspot	23, 30,48
	Gnorimoschema baccharisella	Microlepidoptera	14
	Gnorimoschema bacchariselloides *	Microlepidoptera	14
	Gnorimoschema ericameriae	Microlepidoptera	14
	Gnorimoschema ericoidesi *	Microlepidoptera	14
	Gnorimoschema saphirinella	Microlepidoptera	14
	Icaricia icariodies moroensis	Morro Bay blue butterfly	2,21,23,26
	Lithariapteryx abroniaeella	Microlepidoptera	16
	Lithariapteryx elegans *	Microlepidoptera	16
	Orgyia vetusa	Tussock moth	25
	Papilio erymedon	Pale tiger swallowtail	23
	Papilio rutulus	Western tiger swallowtail	23
	Papilio zelicaon	Anise swallowtail	23
	Peiris rapae	Cabbage butterfly	23
	Phryganidia californica	California oak moth	23
	Precies coenia	Buckeye	23
	Polites sabuleti	Sandhill skipper	23
	Pyrgus albescens	Western checkered skipper	23
	Scrobipalpula psilella	Microlepidoptera	14
	Vanessa atalanta	Red admiral	23
	Vanessa cardui	Painted lady	23
	Vanessa carye	West coast lady	23
Diptera		**Flies**	
	Ablautus schlingeri *	Schlinger's robberfly	13
	Aciurina thoracica	fruit fly	37
	Acrosathe sp.	Stiletto fly	4
	Aedes taeniorchynchus	Southern salt marsh mosquito	23
	Aedes increpitus	mosquito	37
	Anopheles freeborni	mosquito	33
	Anopheles pseudopunctipennis	mosquito	33
	Anorostoma sp.	Heleomyzid fly	23
	Anastoechus leucothrix	Bee fly	23
	Antichaeta testacea	marsh flies	45
	Asilus s p.	Robber fly	23
	Bombylius major	Greater bee fly	23
	Brennania hera	tabanid fly	32
	Chaoborus sp.	Phantom midge	9
	Conophorus collini	Bee fly	23
	Copestylum sp.	Drone fly	23
	Culiseta maccrackenae	mosquito	33
	Culex quinquefasciatus	mosquito	33
	Culex sp.	Mosquito	9
	Diarthronomyia flocculosa	Woolly sagebrush gall gnat	23
	Dictya montana	marsh flies	45
	Ephydra sp.	Shore fly	9
	Eristalis tenax	Common hover fly	23
	Euaresta bellula	fruit fly	37
	Eupeodes volucris	Drone fly	23
	Eutreta pacifica	fruit fly	37
	Eutrata sp.	Fruit fly	23
	Exoprosopa dorcadion	Bee fly	23
	Frucellia rufitibia	anthomyiid fly	46

Frucellia separata	anthomyiid fly	46
Helina procedens	house fly	40
Hemepenthes eumenes	Bee fly	23
Hemepenthes seminigra	Bee fly	23
Leptogaster sp.	Robber fly	23
Limnophora narona	house fly	40
Limonia marmorata	Crane fly	38
Limonia sp.	Crane fly	9
Macrorchis majuscule	house fly	40
Metapogon sp.	Robber fly	23
Mysosargus knowltoni	Soldier fly	34
Nemotelus sp.	Soldier fly	9
Notiphila sp.	Shore fly	9
Orellia occidentalis	fruit fly	37
Ormosia spp.	Crane fly	9
Paralucilia wheeleri	blow fly	36
Paravilla fumida	Bee fly	23
Pericoma sp.	Moth fly	9
Phaenicia sericata	Greenbottle fly	23,36
Pherebella nana nana	marsh flies	45
Pherebella parabelleia	marsh flies	45
Pherocera sp.	Stiletto fly	4
Poecilanthrax poecilogaster interruptus	Bee fly	23
Pseudonomaneura sp.	Mydas fly	23
Ptychoptera lenis	Crane fly	38
Simulium sp.	Black fly	9
Tabanus sp.	Horse fly	23
Tabudamima sp.	Stiletto fly	4
Tendipes tentans	Midge	1
Tetramerinix rufitibia	house fly	40
Tomoplagia cressoni	fruit fly	37
Trupanea claifornica	fruit fly	37
Trupanea wheeleri	fruit fly	37
Villa agrippina	Bee fly	23
Villa cautor	Bee fly	23
Villa lateralis	Bee fly	23
Villa sp.	Bee fly	23
Zabrops sp.	Robber fly	23
Agromyzidae	Leaf flies	23
Bibionidae	March flies	23
Ceratopogonidae	Biting midge	9
Chironomidae	Midge	9,10
Culicidae	Mosquitos	10
Dolichopodidae	Long legged flies	23
Empididae	Dance flies	23
Phoridae	Humpbacked flies	23
Simuliidae	Black flies	10
Syrphidae	Rattail maggot	9
Tachinidae	Tachina flies	23

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19 Dr. Frank Hovore, entomologist, pers. comm.. (email), April 2004

20 Dr. Barry Roth, malacologist, Cal. Acad .Sci.; pers. comm. (email) April, 2004. Informal response. More formal report coming mid-May

21 Telephone conversation with Dennis Sheridan, local entomologist; prepared a report on insects in G-N dunes and VAFB for TNC in 1994. He is going to supply more info on the species he collected at G-N dunes at some time in future (May 10, 2004)

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49 J. Blecha, pers. ob. 2004 of beetle on *Bacharis* in GOF and various other sites in GND.

50 Email from G. Greenwald, Manager GND National Wildlife Refuge June 2006 by W. Wehtji, identified by Dr. Marshal Hedin, SDSU

APPENDIX B

Confirmed and Unconfirmed Amphibian Taxa

		GND HABITATS														
							BLC HABITATS									
SCIENTIFIC NAME	**COMMON NAME**	**Beach, Dune Strand**	**Estuarine**	**Active Sand**	**Foredune**	**Dune Swale**	**Coastal Dune Scrub**	**Riverine**	**Wetlands**	**Riparian**	**Oak Woodland**	**Eucalyptus Forest**	**Agriculture**	**Industrial**	**LEGAL STATUS**	**REFERENCE SOURCES**
CONFRIMED AMPHIBIANS																
Plethodontidae	**Climbing Salamanders**															
Aneides lugubris	Arboreal salamander						●		●	●						6
	Ensatinas															
Ensatina eschscholtzii	Ensatina					❍		❍	●	●						1, JS
	Slender salamanders															
Batrachoseps attenuatus	Black bellied slender salamander								●	●						1, JS
Pelobatidae	**Spadefoot Toads**															
Spea hammondii	Western Spadefoot				●	●	●		●						SC	1, 6, D6
Bufonidae	**True Toads**															
Bufo boreas	Western toad	●			●	●	●	●	●	●						1, 6, 9, 11, 12, D6
Hylidae	**Treefrogs**															
Hyla regilla	Pacific tree frog				●	●	●	●	●	●						1, 6, 9, 10, 11, 12, D6
Ranidae	**True Frogs**															
Rana aurora draytonii	California red-legged frog				●	●	●	●	●	●					FT, SC	1, 6, 9, 10, 11, D6
R. catesbeiana	Bullfrog						●		●						Introduced	1, 6, 10, 11, 12, D6
8	Confirmed Species Count	1	0	0	4	5	6	4	8	6	0	0	0	0		

REFERENCE SOURCES

Code	Author
1	Smith, et al. 1976
6	UNOCAL 1999-2004
JS	J Schneider pers. comm.
9	Entrix Inc. 1996
10	Dames & Moore 1979
11	Burton; Kutilek 1991
12	Kutilek; Shellhammer; Bros 1991
D6	McClelland Engineers, Inc. 1988

HABITAT and LEGAL STATUS LEGEND

Code	Description
●	Confirmed at GND (various authors)
❍	Unconfirmed, likely to occur in GND
✍	Most likely present or anecdotal obs. from pers comm.
FSC	US Fish & Wildlife Species of Concern, Sacramento Office
FT	Federally Threatened Species
FSS	US Forest Service (Region 5) Sensitive Species
SC	Califorinia Dept Fish & Game Species of Concern
SB	Portions of Northern Santa Barbara County

SCIENTIFIC NAME	COMMON NAME	GND HABITATS													LEGAL STATUS	REFERENCE SOURCES
							BLC HABITATS									
		Beach, Dune Strand	Estuarine	Active Sand	Foredune	Dune Swale	Coastal Dune Scrub	Riverine	Wetlands	Riparian	Oak Woodland	Eucalyptus Forest	Agriculture	Industrial		
UNCONFIRMED AMPHIBIAN TAXA																
Ambtstomatidae	**Mole salamanders**															
Ambystoma californiense	California tiger salamander					☜		☜	☜	☜					FE (SB), SC	
Salamandridae	**Pacific Newts**															
Taricha torosa	California newt							❍	☜	☜						
Ranidae	**True Frogs**															
Rana boylii	Foothill yellow-legged frog								☜						SC	
Bufonidae	**True Toads**															
Bufo californicus	Arroyo toad					☜		☜	☜	☜						
4	Unconfirmed Species Count	0	0	0	0	2	0	3	4	3	0	0	0	0		

REFERENCE SOURCES

Code	Author
1	Smith, et a.l 1976
6	UNOCAL 1999-2004
JS	J Schneider pers. comm.
9	Entrix Inc. 1996
10	Dames & Moore 1979
11	Burton; Kutilek 1991
12	Kutilek; Shellhammer; Bros 1991
D6	McClelland Engineers, Inc. 1988

HABITAT and LEGAL STATUS LEGEND

Code	Description
●	Confirmed at GND (various authors)
❍	Unconfirmed, likely to occur in GND
☜	Most likely present or anecdotal obs. from pers comm.
FE	Federally Endangered Species
FSC	US Fish & Wildlife Species of Concern, Sacramento Office
FT	Federally Threatened Species
FSS	US Forest Service (Region 5) Sensitive Species
SC	Califorinia Dept Fish & Game Species of Concern
SB	Portions of Northern Santa Barbara County

APPENDIX C

Confirmed and Unconfirmed Reptilian Taxa

		GND HABITATS														
									BLC HABITATS							
SCIENTIFIC NAME	**COMMON NAME**	**Beach, Dune Strand**	**Estuarine**	**Active Sand**	**Foredune**	**Dune Swale**	**Coastal Dune Scrub**	**Riverine**	**Wetlands**	**Riparian**	**Oak Woodland**	**Eucalyptus Forest**	**Agriculture**	**Industrial**	**LEGAL STATUS**	**REFERENCE SOURCES**
CONFIRMED REPTILIAN TAXA																
Emydidae (S.O. Testudines)	**Box, Water & Pond Turtles**															
Clemmys marmorata pallida	Southwestern Pond turtle								●						FSC, SE	6, 11, 12, D6
Phrynosomatidae	**Side-blotched & Horned Lizards**															
Phrynosoma coronatum frontale	California horned lizard	●		●	●	●	●								FSC, SC	1, 6, 9, 11, 12, D6
Sceloporus occidentalis	Western fence lizard				●	●	●		❍	●						6, 9, 10, 11, 10, D
Uta stansburiana	Side-blotched lizard				●		●			❍						1, 6, 9
Scincidae	**Skinks**															
Eumeces skiltonianus	Skilton's (Western) skink					●	●									1, 6, 9
Teiidae	**Whiptails**															
Cnemidophorus tigris mundus	California whiptail	●				●	●									1, 6
Anguidae	**Alligator lizards**															
Elgaria multicarinata	Southern alligator lizard					●	●			●						1, 6, 9, 10, 11, D6
Anniellidae	**North American Legless Lizards**															
Anniella pulchra pulchra	Silvery (California) legless lizard			●	●	●	●		●						FSC, SC	1, 6, 9, 10, 11, 12
Colubridae	**Colubrids**															
Diadophis punctatus	Ringneck snake					●	●			❍						1, 6, 9, D6
Colubder constrictor mormon	Racer (Western yellow-bellied)					●	●									1, 6, D6
Masticophis flagellum	Coachwhip					❍	❍									1, 6
Masticophis lateralis	Striped racer (or California whipsnake)						●									1, 6, 9
M. lateralis lateralis	Chaparral whipsnake						●									6
Pituophis catenifer	Gopher snake					●	●		❍	●						6, 10, D6
P. catenifer annectens	San Diego gopher snake						●									1, 6
Lampropeltis getula	Common (California) kingsnake						●									1, 6
Thamnophis elegans	Western terrestrial garter snake					●	●	❍	❍	●						1, 6, 9, 10, 11, D6
T. hammondii	Two-striped garter snake				●		●		●	●					SC	1, 6, 9, 11
T. atratus atratus	Aquatic garter snake					●		❍	❍	●						1, 9, 10
T. sirtalis	Common garter snake					●	●	❍	❍	❍						1, 6, 9
Viperidae	**Vipers**															
Crotalus viridis	Western (Pacific) rattlesnake					●	●			❍						1, 6, 9, 10, 11
21	Confirmed Species Count	2	0	2	5	14	19	3	8	10	0	0	0	0		

REFERENCE SOURCES

Code	Author
1	Smith, et al. 1976
6	UNOCAL 1999
9	Entrix Inc. 1996
10	Dames & Moore 1979
11	Burton; Kutilek 1991
12	Kutilek; Shellhammer; Bros 1991
D6	McClelland Engineers, Inc. 1988
D11	Pierson et a.l 2002

HABITAT and LEGAL STATUS LEGEND

Code	Description
●	Confirmed at GND (various authors)
❍	Probable (unconfirmed) in GND
⇖	Unconfirmed but possible occurrence in GND
FSC	US Fish & Wildlife Species of Concern, Sacramento Office
SC	Califorinia Dept Fish & Game Species of Concern
FSS	US Forest Service (Region 5) Sensitive Species
FE	Federally Endangered Species

		GND HABITATS														
									BLC HABITATS							
SCIENTIFIC NAME	**COMMON NAME**	**Beach, Dune Strand**	**Estuarine**	**Active Sand**	**Foredune**	**Dune Swale**	**Coastal Dune Scrub**	**Riverine**	**Wetlands**	**Riparian**	**Oak Woodland**	**Eucalyptus Forest**	**Agriculture**	**Industrial**	**LEGAL STATUS**	**REFERENCE SOURCES**
UNCONFIRMED REPTILIAN TAXA																
Phrynosomatidae	**Side-blotched & Horned Lizards**															
Sceloporus occidentalis biseriatus	Great basin fence lizard					❍										1
S. occidentalis occidentalis	Northwestern fence lizard					❍										1
Colubridae	**Colubrids**															
Contia tenuis	Sharp-tailed snake															
	Racers & Whipsnakes															
Pituophis catenifer catenifer	Pacific gopher snake															1
	Garter Snakes															
Hypsiglena torquata	Night snake (spotted)					❍				❍						1
5	Unconfirmed Species Count	0	0	0	0	3	0	0	0	1	0	0	0	0		

REFERENCE SOURCES

Code	Author
1	Smith, et al. 1976
6	UNOCAL 1999
9	Entrix Inc. 1996
10	Dames & Moore 1979
11	Burton; Kutilek 1991
12	Kutilek; Shellhammer; Bros 1991
D6	McClelland Engineers, Inc. 1988
D11	Pierson et a.l 2002

HABITAT and LEGAL STATUS LEGEND

Code	Description
●	Confirmed at GND (various authors)
❍	Probable (unconfirmed) in GND
	Unconfirmed but possible occurrence in GND
FSC	US Fish & Wildlife Species of Concern, Sacramento Office
SC	Califorinia Dept Fish & Game Species of Concern
FSS	US Forest Service (Region 5) Sensitive Species
FE	Federally Endangered Species

APPENDIX D

Confirned and Unconfirmed Avian Taxa

G-N DUNE HABITATS
BLC HABITATS
GND HABITATS
BLC HABITATS

SCIENTIFIC NAME	COMMON NAME	Beach, Dune Strand	Estuarine	Active Sand	Foredune	Dune Swale	Coastal Dune Scrub	Riverine	Wetlands	Riparian	Oak Woodland	Eucalyptus Forest	Agriculture	Industrial	LEGAL STATUS	REFERENCE SOURCES
CONFIRMED AVIAN TAXA																
DUCKLIKE BIRDS (Misc. Swimmers)																
Gaviidae	**Loons**															
Gavia pacifica	Pacific loon		●						●							1, 9
Gavia adamsii	Yellow-billed loon								●						r	11
Gavia immer	Common loon		●						●						SC	1, 9, 11, MS
Gavia stella	Red-throated loon								●							9, 10, TE
Podicipedidae	**Grebes**															
Aechmophorus clarkii	Clark's grebe		●						●							9, 11
Aechmophorus occidentalis	Western grebe	●	●						●							1, 6, 9, 10, 11, 12, MS
Podiceps auritus	Horned grebe		●						●							1, 6, 11
Podiceps grisegena	Red-necked grebe								●							11
Podiceps nigricollis	Eared grebe		●						●							1, 6, 9, 11, MS
Podilymbus podiceps	Pied-billed grebe								●							1, 6, 9, 11, MS
Phalacrocoracidae	**Cormorants**															
Phalacrocorax auritus	Double-crested cormorant	●	●						●						SC	1, 6, 9, 10, 11, 12, MS
Phalacrocorax pelagicus	Pelagic cormorant								●							11, MS
Phalacrocorax penicillatus	Brandt's commorant	●	●						●							1, 6, 10, MS
Alcidae	**Auks**															
Uria aalge	Common murre	●	●													9, 10
Brachyramphus marmoratus	Marbled murrelet		●												**E**	D55
DUCKLIKE BIRDS - Waterfowl																
Anatidae - Cygnini	**Swans**															
Cygnus columbianus	Tundra swan		●						●							1, 11
Anatidae - Anserini	**Geese**															
Anser albifrons	Greater White-fronted goose		●						●							1, 6, 11, MS
Branta canadensis	Canada goose	●	●			○			●							1, 6, 9, 10, 11, MS
Branta hutchinsii	Cackling goose		●						●							MCAS 2004
Branta nigricans	Brandt, (black)		●						●							1, 6, 9
Chen caerulescens	Snow goose		●						●							1, 6, 11
Chen rossii	Ross goose		●						●							1, TE
Anatidae - Dendrocygnini	**Whistling-Ducks**															
Dentrocygni bicolor	Fulvous whistling-duck		●					●							SC	D55, D99
Anatidae - Anatini	**Marsh Ducks**															
Aix sponsa	Wood duck								●	●						1, 11
Anas acuta	Northern pintail	●	●					○	●							1, 6, 9, 10, 11, MS
Anas americana	American widgeon		●					○	●							1, 6, 10, 11, MS
Anas clypeata	Northern shoveler	●	●					○	●							1, 6, 9, 10, 11, MS
Anas crecca	Green-winged teal	●	●		●	○		○	●							1, 6, 9, 10, 11, D6
Anas cyanoptera	Cinnamon teal	●	●					○	●							1, 6, 9, 10, 11, D6, MS
Anas discors	Blue-winged teal	●	●			●		○	●							1, 6, 10, 11, MS
Anas penelope	Eurasian widgeon		●					○	●							1, 11
Anas platyrhynchos	Mallard	●	●			●	●	●	●							1, 6, 9, 10, 11, 12, D6, MS

G-N DUNE HABITATS
BLC HABITATS
GND HABITATS
BLC HABITATS

SCIENTIFIC NAME	**COMMON NAME**	**Beach, Dune Strand**	**Estuarine**	**Active Sand**	**Foredune**	**Dune Swale**	**Coastal Dune Scrub**	**Riverine**	**Wetlands**	**Riparian**	**Oak Woodland**	**Eucalyptus Forest**	**Agriculture**	**Industrial**	**LEGAL STATUS**	**REFERENCE SOURCES**
Anas querquedula	Garganey		●													D55
Anas strepera	Gadwall		●					○	●							1, 6, 9, 11, MS
Anatidae - Mergini	**Sea Ducks, Mergansers**															
Clangula hyemalis	Oldsquaw [Long tailed duck]	●	●						●							1, 12, D55
Melanitta fusca (deglandi)	White-winged scoter	●	●						●							1, 10, 11
Melanitta nigra	Black scoter	○	●													9
Melanitta perspicillata	Surf scoter	●	●						●							1, 10, 11, 12
Mergus merganser	Common merganser		●						●							1, 11, MS
Mergus serrtator	Red-breasted merganser		●						●							1, 6, 11
Anatidae - Aythyini	**Bay Ducks**															
Aythya affinis	Lesser scaup		●						●							1, 6, 10, 11, TE
Aythya americana	Redhead		●						●							1, TE
Aythya collaris	Ring-necked duck	●	●						●							1, 6, 11, 12, MS
Aythya marila	Greater scaup		●						●							1, 11, MS
Aythya valisineria	Canvasback		●						●							1, 9, 11, MS
Bucephala albeola	Bufflehead	●	●						●							1, 6, 10, 11, MS
Bucephala clangula	Common goldeneye		●						●							1, TE
Anatidae - Oxyurini	**Stiff-tailed Ducks**															
Oxyura jamaicensis	Ruddy duck	●	●						●							1, 6, 9, 10, 11, MS
Rallidae	**Duck-like Swimmers**															
Fulica americana	American coot	●	●				●		●	●						1, 6, 9, 10, 11, 12, D6, MS
Gallinula chloropus	Common moorhen								●							1, 6, 11, MS
SEABIRDS, GULLS, etc. (Areialists)																
Procellariidae	**Shearwaters**															
Puffinus puffinus	Manx shearwater	●	●													D9
Puffinus creatopus	Pink-footed shear water	●	●													MCAS 2004
Puffinus griseus	Sooty shearwater	●	●													MCAS 2004
Puffinus opisthomelas	Black-vented shearwater	●	●													MCAS 2004
Pelicanidae	**Pelicans**															
Pelicanus erythrorhynchos	White pelican		●						●						SC	1, 11, MS
Pelicanus occidentalis californicus	California brown pelican	●	●						●						FE, SE	1, 6, 9, 10, 11, 12, MS
Fregatidae	**Frigatebird**															
Fregata magnificens	Magnificent frigatebird	●	●													D55, D99
Laridae	**Jaegers, Skimmers**															
Rynchops niger	Black Skimmer	●														MCAS 2004
Stercorarius parasiticus	Parasitic jaeger	●														MCAS 2004
Laridae	**Gulls**															
Larus argentatus	Herring gull	●	●						●							1, 6, 9, 10, 11, 12, TE
Larus atricilla	Laughing gull								●							6, MS
Larus californicus	California gull	●	●						●						SC	1, 6, 9, 10, 11, 12, MS
Larus canus	Mew gull	●	●						●							1, 6, 9, 10, 11, 12, TE
Larus delewarensis	Ring-billed gull	●	●						●							1, 6, 9, 10, 11, 12, MS
Larus glaucescens	Glaucous-winged gull	●	●		●				●							1, 6, 9, 10, 12, TE
Larus heermanni	Heermann's gull	●	●						●						r	1, 6, 9, 10, 12, MS

G-N DUNE HABITATS
BLC HABITATS
GND HABITATS
BLC HABITATS

SCIENTIFIC NAME	COMMON NAME	Beach, Dune Strand	Estuarine	Active Sand	Foredune	Dune Swale	Coastal Dune Scrub	Riverine	Wetlands	Riparian	Oak Woodland	Eucalyptus Forest	Agriculture	Industrial	LEGAL STATUS	REFERENCE SOURCES
Larus minutus	Little gull		●						●							
Larus occidentalis	Western gull	●	●						●							1, 6, 9, 10, 11, 12, TE
Larus philadelphia	Bonaparte's gull	●	❍						●							1, 6, 10, 11, 12, D99
Larus pipixcan	Franklin's gull		●						●							CM
Larus thayeri	Thayer's gull	❍	●		❍											6, TE
Rissa tridactyla	Black-legged kittiwake	●							●							
Xema sabini	Sabine's gull		●													9
Laridae	**Terns**															
Chilidonias niger	Black tern	●	●												SC	11, TE
Sterna antillarum browni	California least tern	●	●		●			●	●						FE, SE	1, 6, 9, 10, 11, 12, D10, MS
Sterna caspia	Caspian tern	●	●						●							1, 6, 9, 10, 11, 12, MS
Sterna elegans	Elegant tern	●	●												SC, r	6, 11, 12, TE
Sterna forsteri	Forster's tern	●	●						●							1, 6, 10, 11, 12, MS
Sterna hirundo	Common tern	●							●							6, 10, MS
Sterna maxima	Royal tern	●	●						●							1, 6, 10, TE
Sterna paradisaea	Arctic tern	●	●													D99
LONG-LEGGED WADING BIRDS																
Ardeidae	**Herons, Bitterns**															
Ardea alba	Great egret		●			❍		❍	●	❍					SC	1, 6, 9, 10, 11, TE
Ardea herodias	Great blue heron	●	●			❍		❍	●	●					SC	1, 6, 9, 10, 11, 12, TE
Botaurus lentiginosus	American bittern	●			●				●							1, 6, 9, 10, 11, MS
Bubulcus ibis	Cattle egret								●							10, TE
Butorides virescens	Green heron		●			●	●	●	●	●						1, 6, 9, 11, MS
Egretta thula	Snowy egret	●	●			❍		❍	●	❍						1, 6, 10, 11, 12, MS
Ixobrychus exilis	Least bittern								●						SC	1, TE
Nycticorax nycticorax	Black-crowned night heron	●	●			❍			●	●						1, 6, 9, 10, 11, 12, TE
Threskiornithidae	**Ibises**															
Plegadis chihi	White-faced ibis				●				●						SC	6, MS
SMALLER WADING BIRDS																
Rallidae	**Rails**															
Laterallus jamaicaensis	Black rail		●						●						SE, r	1, 11
Porzana carolina	Sora		●						●							1, 6, 9, 10, 11, MS
Rallus limicola	Virginia rail		●						●							1, 6, 9, 10, 11, D55, MS
Haematopodidae	**Oystercatchers**															
Haematopus bachmani	Black oystercatcher		●												y	1, D55, TE
Charadriidae	**Plovers**															
Charadrius alexandrinus nivosus	Western snowy plover	●	●	●	●		●		●						FT, SC, r	1, 6, 9, 10, 11, 12, D10, D55
Charadrius montanus	Mountain plover		●												SC, r	6, WW
Charadrius semipalmatus	Semipalmated plover	●	●						●							1, 6, 9, 10, 12, D55, TE
Charadrius vociferous	Killdeer	●	●	●	●		●	●	●							1, 6, 9, 10, 11, 12, D6, MS
Pluvialis dominica	American golden-plover		●												y	6, WW
Pluvialis fulva	Pacific golden plover		●						●						y	6, 9, TE, WW
Pluvialis squatarola	Black-bellied plover	●	●													1, 6, 9, 10, 11, 12, D55, MS

G-N DUNE HABITATS — **GND HABITATS** / **BLC HABITATS**

SCIENTIFIC NAME	COMMON NAME	Beach, Dune Strand	Estuarine	Active Sand	Foredune	Dune Swale	Coastal Dune Scrub	Riverine	Wetlands	Riparian	Oak Woodland	Eucalyptus Forest	Agriculture	Industrial	LEGAL STATUS	REFERENCE SOURCES
Recurvirostridae	**Avocets, Stilts**															
Himantopus mexicanus	Black-necked stilt	●	●						●							1, 6, 9, 10, MS
Recurvirostra americana	American avocet	●	●						●							1, 6, 9, 10, 12, MS
Scolopacidae	**Sandpipers, Snipe, Phalaropes**															
Actitis macularia	Spotted sandpiper		●					❍	●							1, 6, 9, 11, MS
Aphriza virgata	Surfbird	●	●												y	1, TE
Arenaria interpres	Ruddy turnstone	●	●													1, 6, 9, 10, TE
Arenaria melanocephala	Black turnstone	●	❍												y	1, 6, 9, TE
Calidris acuminata	Sharp-tailed sandpiper		●													D55
Calidris alba	Sanderling	●	●		❍				●							1, 6, 9, 10, 11, 12, D55, MS
Calidris alpina	Dunlin	●	●						●							1, 6, 9, 10, 11, 12, TE
Calidris bairdii	Baird's sandpiper	●	●						●							6, 9, 10, TE
Calidris canutus	Red knot	●	●												y	1, 6, 9, MS
Calidris fuscicollis	White-rumped sandpiper	●	●													11
Calidris himantopus	Stilt sandpiper		●													D55
Calidris mauri	Western sandpiper	●	●						●							1, 6, 9, 10, 11, 12, D55, MS
Calidris melanotos	Pectoral sandpiper		●						●							6, 9, TE
Calidris minutilla	Least sandpiper	●	●					●	●							1, 6, 9, 10, 11, D55, MS
Calidris pusilla	Semipalmated sandpiper	❍	●													6, D55, TE
Calidris ruficollis	Red-necked stint		●													D9, D55
Catoptrophorus semipalmatus	Willet	●	●						●							1, 6, 9, 10, 11, 12, D55, TE
Gallinago delicata	Wilson's (common) snipe		❍					❍	●							1, 6, 10, 11, MS
Heteroscelus incanus	Wandering tattler	●	●													D55, D99
Limnodromus griseus	Short-billed dowitcher	❍	●				●	●	●						y	1, 6, 9, 10, 11, D55, TE
Limnodromus scolopaceus	Long-billed dowitcher	❍	●					●	●							1, 6, 9, 10, 11, D55, TE
Limosa fedoa	Marbled godwit	●	●				●		●						y	1, 6, 9, 10, 12, D55, MS
Numenius americanus	Long-billed curlew	●	●		●		●		●						SC, r	1, 6, 9, 10, 11, 12, D55, MS
Numenius minutus	Little curlew	●	●													D55, CBRC
Numenius phaeopus	Whimbrel	●	●						●						y	1, 6, 9, 10, 12, D55, MS
Phalaropus fulicarius	Red phalarope		●						●							1, 6, TE
Phalaropus lobatus	Red-necked phalarope		●						●							1, 6, 9, 10, 11, MS
Phalaropus tricolor	Wilson's phalarope		●						●						y	6, 9, 10, MS
Philomachus pugnax	Ruff		●													D55
Tringa flavipes	Lesser yellowlegs	●	●						●							1, 6, 12, TE
Tringa melanoleuca	Greater yellowlegs		●			❍			●							1, 6, 9, 10, 11, D55, MS
Tringa solitaria	Solitary Sandpiper	●	●													D55, D99
Tryngites subruficollis	Buff-breasted sandpiper		●												r	6, WW
FOWL-LIKE BIRDS																
Phasianidae	**Pheasants, Quail**															
Callipepla californica	California quail				●	●	●			●						1, 6, 9, 10, 11, 12, D6, MS
Phasianus colchicus	Ring-necked pheasant					❍	●		❍							6, 9
BIRDS OF PREY																
Cathartidae	**American Vultures**															
Cathartes aura	Turkey vulture	●	●		●	●	●		●	●	●	●				1, 6, 9, 10, 11, 12, D6, MS

		G-N DUNE HABITATS														
		GND HABITATS							BLC HABITATS							
SCIENTIFIC NAME	**COMMON NAME**	**Beach, Dune Strand**	**Estuarine**	**Active Sand**	**Foredune**	**Dune Swale**	**Coastal Dune Scrub**	**Riverine**	**Wetlands**	**Riparian**	**Oak Woodland**	**Eucalyptus Forest**	**Agriculture**	**Industrial**	**LEGAL STATUS**	**REFERENCE SOURCES**
Accipitridae	**Kites, Hawks, Eagles, Osprey**															
Accipiter cooperii	Cooper's hawk				●	●	●		○	●	●	●			SC	1, 6, 9, 10, 11, 12, D6, MS
Accipiter striatus	Sharp-shinned hawk					●	●	●	●		●	●			SC	1, 9, 11, 12, D10
Aquilla chrysaetos	Golden eagle	●					●		●		●	●			SC	1, 6, TE
Buteo jamaicensis	Red-tailed hawk				●	●	●		●	●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Buteo lagopus	Rough-legged hawk		●		●	●	●		●		●	●				1, 11
Buteo lineatus	Red-shouldered hawk	●			●	○	●			●	●	●				1, 6, 9, 11, D6, MS
Buteo regalis	Ferruginous hawk		●		●		●		●		●	●			SC, y	1, 9, 11, TE
Buteo swainsoni	Swainson's hawk				●	●	●		●		●	●			ST. y	1, 6, 11, TE
Circus cyaneus	Northern harrier (Marsh hawk)	●	●		●	●	●	●	●						SC	1, 6, 9, 10, 11, D6, MS
Elanus leucurus	White-tailed kite					●	●	●	●	●	●	●	●		SC	1, 6, 9, 10, 11, 12, TE
Haliaeetus leucocephalus leucocephaus	Bald eagle									●		●				MCAS 2004
Pandion haliaetus	Osprey		●				●	●	●	●					SC	1, 6, 11, MS
Falconidae	**Falcons**															
Falco columbarius	Merlin	○	●		●	●	●		●	●	●	●			SC	1, 6, 9, 11, 12, TE
Falco mexicanus	Prairie falcon		●												SC	6, TE
Falco peregrinus anatum	Peregrine falcon	●	●		●	●	●		●						SE	1, 6, 9, 11, MS
Flaco sparverius	American kestrel		●		●	●	●		●	●	●	●				1, 6, 9, 10, 11, D6, MS
Tytonidae	**Barn Owls**															
Tyto alba	Barn owl	●			●	●	●		●	●	●	●				1, 6, 9, 11, 12, TE
Strigidae	**Owls**															
Asio otus	Long-eared owl					●	●			●	●	●			SC	1, 6, 9
Asio flammeus	Short-eared owl		●				●		●	●					SC, y	1, 6, TE
Athene cunicularia	Burrowing owl			●		●	●								SC	1, 6, TE
Bubo virginianus	Great-horned owl				●	●	●			●	●	●				1, 6, 9, 11, 12, MS
NONPASSERINE LAND BIRDS																
Caprimulgidae	**Goatsuckers**															
Chordeiles minor	Common Nighthawk					●	●			●						12
Phalaenoptilus nuttallii	Common Poorwill				●	●	●			●						1, 6, 9, 10, TE
Apoididae	**Swifts**															
Aeronautes saxatalis	White-throated swift	●	●						●		●	●			y	1, 6, 11, TE, WW
Chaetura vauxi	Vaux swift								●						SC	11, MS
Cypseloides niger	Black swift								●						SC, y	6, 11, MS, WW
Trochilidae	**Hummingbirds**															
Archilochus alexandri	Black-chinned hummingbird								○	●	○					6, 9, TE
Calypte anna	Anna's hummingbird				●	●	●		●	●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Calypte costae	Costa's hummingbird						●			●					y	6, 11, MS
Cynanthus latirostris	Broad-billed hummingbird									●						D9
Selasphorus rufus	Rufous hummingbird				●	●	●			●	●	●			y	1, 6, 9, 11, D6, MS
Selasphrous sasin	Allen's hummingbird				●	●	●			●	●	●			y	1, 10, 11, D6, MS
Alcedinidae	**Kingfishers**															
Ceryle alcyon	Belted kingfisher	●	●					●	●	●	●	●				1, 6, 9, 11, D6, MS
Picidae	**Woodpeckers**															
Colaptes auratus	Northern flicker				●	●	●			●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Melanerpes formicivorus	Acorn woodpecker				●	●	●		●	●	●	●				1, 10, TE

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SCIENTIFIC NAME	COMMON NAME	Beach, Dune Strand (GND HABITATS)	Estuarine	Active Sand	Foredune	Dune Swale	Coastal Dune Scrub	Riverine	Wetlands (BLC HABITATS)	Riparian	Oak Woodland	Eucalyptus Forest	Agriculture	Industrial	LEGAL STATUS	REFERENCE SOURCES
Picoides nutallii	Nuttall's woodpecker					●	●			●					r	6, 9, 10, 11, 12, MS
Picoides pubescens	Downy woodpecker				●	●	●		●	●	●	●				1, 6, 9, 10, 11, 12, MS
Picoides villosus	Hairy woodpecker				●	●	●		●	●	●	●				1, 6, 9, MS
Sphyrapicus ruber	Red-breasted sapsucker						●			●						10, MS
Sphyrapicus varius	Yellow-bellied sapsucker									●						1
Columbidae	**Pigeons, Doves**															
Columbia faciata	Band-tailed pigeon									●	●	●				MCAS 2004
Columba liva	Rock dove	●	●			●	●									1, 9, 10, 12, D6, MS
Streptopelia decaocto	Eurasian collared dove								●	●						MS
Zenaida macroura	Mourning dove				●	●	●		●	●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Cuculidae	**Cuckoos and Allies**															
Coccyzus americanus	Western yellow-billed cuckoo									●					SE	11, TE
Geococcyx californianus	Roadrunner (Greater)				●	●	●				●	●				1, 6, 9, TE
PASSERINE (Perching) BIRDS																
Tyrannidae	**Tyrant Flycatchers**															
Conotopus sordidulus	Western wood pewee								●	●	●					1, 6, 9, 10, MS
Conotopus cooperi	Olive-sided flycatcher									●					y	6, 10, TE
Empidonax difficilis	Pacific-slope flycatcher						●			●	●	●				1, 6, 9, 11, 12, D6, MS
Empidonax hammondii	Hammond's flycatcher					●			●	●						TE
Empidonax minimus	Least flycatcher		●													D55, D99
Empidonax oberholseri	Dusky flycatcher									●						11
Empidonax trailii	Willow flycatcher									●						MS
Empidonax wrightii	Gray flycatcher								●	○						D55, D99
Myiarchus cinerascens	Ash-throated flycatcher				●	●	●			●	●	●				1, 6, 9, 10, TE
Myiarchus crinitus	Great crested flycatcher		●						●							D9
Sayornis nigricans	Black phoebe	●			●	●	●	●	●	●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Sayornis phoebe	Eastern phoebe									●						11
Sayornis saya	Say's phoebe	●	●		●	●	●		○							1, 6, 9, 10, 11, 12, D6, MS
Tyrannus melancholicus	Tropical kingbird						●			●						11, MS
Tyrannus verticalis	Western kingbird				●	●	●			●						1, 6, 11, D6, MS
Tyrannus vociferans	Cassin's kingbird					●	●									TE
Alaudidae	**Larks**															
Eremophila alpestris actia	California horned lark	●	●	●	●	●	●		●						SC	1, 6, 9, 10, TE
Hirundinidae	**Swallows**															
Hirundo rustica	Barn swallow	●	●		●	●	●	○	●	●	●	●				1, 6, 9, 10, 11, 12, MS
Petrochelidon (Hirundo) pyrrhonota	Cliff swallow	●	●		●	●	●	○	●	●	●	●				1, 6, 9, 10, 11, 12, MS
Progne subis	Purple martin	●	●		●	●	●		●	●	●	●			SC	1, TE
Riparia riparia	Bank swallow								●						ST	MS
Stelgidopteryx serripennis	N. rough winged swallow	●	●		●	●	●	○	●	●	●	●				1, 6, 9, 10, 11, MS
Tachycineta bicolor	Tree swallow	●	●	●	●	●	●	●	●	●	●	●				1, 6, 9, 11, MS
Tachycineta thalassina	Violet-green swallow	●	●	○	●	●	●	●	●	●	●	●				1, 6, 9, 10, 11, D6, MS
Corvidae	**Crows, Ravens, Jays**															
Aphelocoma coerulescens	Western Scrub jay				●	●	●		●	●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Corvus brachyrhynchos	American crow	●	●		●	○	●		○	●	●	●				1, 6, 11, 12, D6, MS
Corvus corax	Common raven	●	●		●	●	●			●	●	●				1, 6, 10, 11, 12, TE

G-N DUNE HABITATS

BLC HABITATS

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SCIENTIFIC NAME	COMMON NAME	Beach, Dune Strand	Estuarine	Active Sand	Foredune	Dune Swale	Coastal Dune Scrub	Riverine	Wetlands	Riparian	Oak Woodland	Eucalyptus Forest	Agriculture	Industrial	LEGAL STATUS	REFERENCE SOURCES
Sittidae	**Nuthatches**															
Sitta canadensis	Red-breasted nuthatch									●						6, WW, MS
Sitta carolinensis	White-breasted nuthatch									●						6, WW, MS
Sitta pygmaea	Pygmy nuthatch									●						TE
Certhiidae	**Creepers**															
Certhis americana	Brown creeper									●	●					1, 6, 10, TE
Paridae	**Chickadees, Titmice**															
Baeolophus (Parus) inornatus	Oak (plain) titmouse				●	●	●			●	●	●			y	1, 9, 12, D6, MS
Poecile (Parus) rufescens	Chestnut-backed chickadee						●			●	●	●				1, 6, 9, 10, 11, MS
Aegithalidae	**Bushtit**															
Psaltriparus minimus	Bushtit				●	●	●			●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Troglodytidae	**Wrens**															
Cistothorus palustris	Marsh wren		●				●		●							1, 6, 9, 10, 11, 12, D6, MS
Thyomanes bewickii	Bewick's wren				●	●	●		●	●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Troglodytes aedon	House wren				●	●	●			●	●	●				1, 6, 9, 10, 11, TE
Troglodytes troglodytes	Winter wren									●	●					1, 6, TE
Regulidae	**Kinglets**															
Regulus calendula	Ruby-crowned kinglet				●	●	○			●	●	●				1, 6, 9, 10, 11, 12, MS
Regulus satrapa	Golden-crowned kinglet						●			●						TE
Sylviidae	**Gnatcatchers**															
Polioptila caerulea	Blue-grey gnatcatcher				●	●	●			●	●	●				1, 6, 12, TE
Turdidae	**Thrushes**															
Catharus guttatus	Hermit thrush				●	●	●			●						1, 11, 12, MS
Catharus ustulatus	Swainson's thrush		●				○			●	●	●				1, 9, 11, D55, MS
Sialia currucoides	Mountain bluebird		●													6, D55
Sialia mexicana	Western bluebird					●	○			●	●	●				1, 6, 10, D6, TE
Turdus migratorius	American robin					●	●			●	●	●	●			1, 6, 10, 11, D6, MS
Timaliidae	**Wrentit**															
Chamaea fasciata	Wrentit				●	●	●			●					y	1, 6, 9, 10, 11, 12, D6, MS
Mimidae	**Mimic Thrushes**															
Dumetella carolinensis	Gray catbird									●						CBRC
Mimus polyglottos	Northern Mockingbird					●	●			●	●	●				1, 6, 10, 11, MS
Toxostoma redivivum	California thrasher				●	●	●		●	●					y	1, 6, 9, 10, 11, 12, D6, MS
Motacillidae	**Pipits**															
Anthus cervinus	Red-throated pipit		●													CBRC
Anthus (spinoletta) rubescens	American (water) pipit	●	●		●				●							6, 9, 10, 11, 12, MS
Bombycillidae	**Waxwings**															
Bombycilla cedorum	Cedar waxwing				●	●	●		●	●	●	●				1, 6, 11, MS
Vireonidae	**Vireos**															
Vireo bellii	Bell's vireo							○		●					r	TE
Vireo flavoviridis	Yellow green vireo								●							D9
Vireo gilvus	Warbling vireo								●	●						1, 6, 10, MS
Vireo huttoni	Hutton's vireo						●			●						6, 9, 10, 11
Vireo solitrius	Blue-headed (solitary) vireo					○				●						TE

		G-N DUNE HABITATS														
									BLC HABITATS							
		GND HABITATS														
									BLC HABITATS							
SCIENTIFIC NAME	**COMMON NAME**	**Beach, Dune Strand**	**Estuarine**	**Active Sand**	**Foredune**	**Dune Swale**	**Coastal Dune Scrub**	**Riverine**	**Wetlands**	**Riparian**	**Oak Woodland**	**Eucalyptus Forest**	**Agriculture**	**Industrial**	**LEGAL STATUS**	**REFERENCE SOURCES**
Laniidae	**Shrikes**															
Lanius ludovicianus	Loggerhead shrike	●		●	●	●	●		●	●					SC	1, 6, 9, 10, 11, 12, TE
Sturnidae	**Starlings**															
Sturnus vulgairs	European starling	●	●		●	●	●		●	●	●	●				1, 6, 9, 10, 12, D6, MS
Parulidae	**Wood Warblers**															
Dendroica coronata	Yellow-rumped warbler					●	●			●	●	●				1, 6, 10, 11, 12, MS
Dendroica fusca	Blackburnian warbler								●	●						TE
Dendroica magnolia	Magnoila warbler								●	●						D55, TE
Dendroica nigrescens	Black-throated grey warbler						●			●						11, MS
Dendroica occidentalis	Hermit warbler						●			●					y	6, 11, MS
Dendroica pensylvanica	Chestnut-sided warbler								●	●						D55, MS
Dendroica petechia	Yellow warbler						●	○		●	●	●			SC	1, 6, 9, 10, 11, 12, MS
Dendroica pinus	Pine warbler						●			●						D9, TE
Dendroica striata	Blackpoll warbler									●						MS
Dendroica townsendi	Townsend's warbler						●			●	●	●				1, 6, 10, 11, 12, MS
Dendroica virens	Black-throated green warbler						●	●		●						11, MS
Geothlypis trichas	Common yellowthroat						●		●	●						1, 6, 10, 11, 12, D6, MS
Icteria virens	Yellow-breasted chat									●					SC	6, 10, D6
Mniotilta varia	Black and white warbler									●						MS
Oporonis agilis	Connecticut warbler									●						D99
Oporonis tolmiei	MacGillivray's warbler						●									12, TE
Parula americana	Northern parula								●							D55, MS
Phylloscopus borealis	Artic warbler						●			●						D3, D9, TE
Protonotaria citrea	Prothonotary warbler									●						MCAS 2004
Seiurus aurocapillus	Ovenbird									●						D99
Seiurus noveboracensis	Northern waterthrush								●							MS
Setophaga ruticilla	American redstart									●						MS
Vermivora celata	Orange-crowned warbler						●			●						6, 9, 10, 11, MS
Vermivora luciae	Lucy's warbler									●						MCAS 2004
Vermivora peregrina	Tennessee warbler						○		●	●						TE
Vermivora ruficapilla	Nashville warbler						○		●	●						MS
Wilsonia canadensis	Canada warbler								●	●						MS
Wilsonia pusilla	Wilson's warbler						●		●	●						1, 6, 9, 10, 11, 12, MS
Icteridae	**Blackbirds, Orioles**															
Agelaius phoeniceus	Red-winged blackbird		●		●	●	●		●	●						1, 6, 9, 10, 11, 12, D6, MS
Agelaius tricolor	Tri-color blackbird						●		●	●					SC, y	1, 11, TE
Euphagus cyanocephalus	Brewer's blackbird	●	●		●	●	●		●	●						1, 6, 9, 10, 11, 12, D6, MS
Icterus bullockii	Bullock's oriole					●	●			●	●	●				1, 6, 9, 10, TE
Icterus cucullatus	Hooded oriole								●							10, MS
Icterus spurius	Orchard oriole									●		●				D99, MCAS
Molothrus ater	Brown-headed cowbird				●	●	●		●	●						1, 6, 10, 11, MS
Quiscalus mexicanus	Great-tailed grackle								●							6, MS
Sturnella neglecta	Western meadowlark				●	●	●		○	●						1, 6, 9, 10, 11, 12, D6, MS
Xanthocephalus xanthocephalus	Yellow-headed blackbird								●							MS

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SCIENTIFIC NAME	**COMMON NAME**	**Beach, Dune Strand**	**Estuarine**	**Active Sand**	**Foredune**	**Dune Swale**	**Coastal Dune Scrub**	**Riverine**	**Wetlands**	**Riparian**	**Oak Woodland**	**Eucalyptus Forest**	**Agriculture**	**Industrial**	**LEGAL STATUS**	**REFERENCE SOURCES**
Thraupidae	**Tanagers**															
Piranga ludoviciana	Western tanager						●			●	●	●				1, 6, 11, MS
Piranga olivacea	Scarlet tanager						●			●						D9, MS
Piranga rubra	Summer tanager									●						MS
Emberizidae	**Sparrows, Towhees, Juncos**															
Amphispiza belli	Sage sparrow						●									6, JAS, D55
Calcarius lapponicus	Lapland longspur		●						●							D99
Chondestes grammacus	Lark sparrow						●									6, TE
Junco hyemalis aikeni	Dark-eyed junco				●	●	●			●	●	●				1, 6, MS
Melospiza georgiana	Swamp sparrow								●	●						6, MS
Melospiza lincolnii	Lincoln's sparrow						●		●	●						6, 10, MS
Melospiza melodia	Song sparrow				●	●	●		●	●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Passer domesticus	House sparrow				●	●	●		●	●	●	●				1, 6, 9, D6, MS
Passerella iliaca	Fox sparrow				●	●	●			●	●	●				1, 11, MS
Passerculus sandwichensis	Savannah sparrow		●		●	●	●		●							1, 6, 9, 10, TE
Pipilo crissalis	California (Brown) towhee				●	●	●			●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Pipilo maculatus	Spotted towhee				●	●	●			●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Spizella pallida	Clay-colored sparrow								●							TE, D55
Spizella passerina	Chipping sparrow				●	●	●		○	●	●	●				1, 10, TE
Zonotrichia albicollis	White-throated sparrow						●			●						TE
Zonotrichia atricapilla	Golden-crowned sparrow				●	●	●			●	●	●				1, 9, 11, 12, MS
Zonotrichia leucophyrs	White-crowned sparrow	●			●	●	●		●	●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Cardinalidae	**Grosbeaks, Buntings**															
Passerina ciris	Painted bunting		●													D9
Pheucticus ludovicianus	Rose-breasted grosbeak									●						TE
Pheucticus melanocephalus	Black-headed grosbeak						●			●	●	●				1, 6, 9, MS
Fringillidae	**Finches**															
Carpodacus mexicanus	House finch	●		●	●	●	●		●	●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Carpodacus purpureus	Purple finch						●			●	●	●				1, 9, 11, MS
Carduelis (Spinus) pinus	Pine siskin								○	●	●					1, 10, TE
Carduelis (Spinus) lawrencei	Lawrence's goldfinch				●	●	●			●	●	●			r	1, 9, TE
Carduelis (Spinus) psaltria	Lesser goldfinch				●	●	●		●	●	●	●				1, 6, 9, 10, 11, 12, MS
Carduelis (Spinus) tristis	American goldfinch				●	●	●		●	●	●	●				1, 6, 9, 10, 11, 12, D6, MS
Loxia curvirostra	Red crossbill								●	●						D55

REFERENCE SOURCES

Code	Author
1	Smith, et al. 1976
6	UNOCAL 2000-2004 QEMRs
9	Entrix Inc. 1996
10	Dames & Moore 1979
11	Burton; Kutilek 1991
12	Kutilek; Shellhammer; Bros 1991
D3	Erickson, RA; Hamilton. 1998
D6	McClelland Engineers, Inc. 1988
D9	CBRC Database 2004
D10	CDFG. 2004. Rare Find
D55	Lehman 1994
D99	Marantz 1986
MCAS	Morro Coast Audubon Society
CBRC	California Bird Record Committee
JAS	Julie Schneider
WW	Walter Wehtje

Personal Communication

MS	M Smith
TE	Tom Edell

HABITAT and LEGAL STATUS LEGEND

Code	Description
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❍	Reported probable (unconfirmed) in GND
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FSS	US Forest Service (Region 5) Sensitive Species
FE	Federally Endangered Species
FT	Federally Threatened Species
y	Audubon yellow listed
r	Audubon red listed
SE	California Endangered
ST	California Threatened

***TAXONOMIC CHANGES**

1	Olor columbianus	Whistling swan, now Tundra swan
3	Gallinula chloropus	Common gallinule to Common moorhen
5	Gallinago (Capella) gallinago	Common snipe
7	Elanus caeruleus	Black-shouldered kite, now white tailed kite
9	Dendrocopos villosus	Hairy woodpecker
11	Eremophila alpestris actia	California horned lark is just horned lark
13	Iridoprocene bicolor	Tree swallow
15	Telmatodytes palustris	Long-billed marsh wren
17	Sturnus bulgairs	Starling is European starling
19	Pipilo erythrophthalmus	Rufus-sided towhee

***TAXONOMIC CHANGES**

2	Anas acuta	Pintail changed to Northern pintail
4	Butorides striatus	Green-backed heron (same as Green heron)
6	Lobipes loabatus to Phalaropus lobatus	Northern phalarope changed to Red-necked phalarope
8	Dendrocopos pubescens	Downy woodpecker
10	Empidonax difficilis	Western flycatcher changed to pacific slope flycatcher
12	Stelgidopteryx ruficollis	S.serripennis split from S. ruficollis, a form extralimital to AOU list
14	Parus inornatus	Plain titmouse
16	Anthus spinoletta	Water pipit
18	Icterus galbula bullockii	Northern oriole

		GND HABITATS							BLC HABITATS							
SCIENTIFIC NAME	COMMON NAME	Beach, Dune Strand	Estuarine	Active Sand	Foredune	Dune Swale	Coastal Dune Scrub	Riverine	Wetlands	Riparian	Oak Woodland	Eucalyptus Forest	Agriculture-Orchards	Industrial	LEGAL STATUS	REFERENCE SOURCES
UNCONFIRMED AVIAN TAXA																
DUCKLIKE BIRDS (Misc.Swimmers)																
Alcidae	**Auks**															
Cepphus columba	Pigeon guillemot															9, 10
Cerorhinca monocerata	Rhinoceros auklet															9
Ptychoramphus aleuticus	Cassin's auklet															9
Synthliboramphus hypoleucus	Xantus's murrelet														r	9
DUCKLIKE BIRDS (Waterfowl)																
Anatidae - Mergini	**Sea Ducks, Mergansers**															
Histrionicus histrionicus	Harlequin duck		❍						❍						SC	6, 9
Lophodytes cucullatus	Hooded merganser		❍						❍							1, 9
SEABIRDS, GULLS, etc. (Areialists)																
Procellariidae	**Fulmars and Shearwaters**															
Fulmarus glacialis	Northern fulmar	❍														9
Laridae	**Jaegers**															
Stercorarius longicaudus	Long-tailed jaeger															9
Stercorarius pomarinus	Pomarine jaeger															9
UNCONFIRMED LONG-LEGGED WADING BIRDS																
Ciconiidae	**Stork**															
Mycteria americana	Wood stork								❍							D99
Gruidae	**Crane**															
Grus canadensis	Sandhill crane [nr Guadalupe 1979]															D55
SMALLER WADING BIRDS																
Rallidae	**Rails**															
Rallus longirostris	Clapper rail		❍						❍						FE, SE	1, 10
BIRDS OF PREY																
Accipitridae	**Kites, Hawks, Eagles, Osprey**															
Accipiter gentilis	Goshawk									❍	❍	❍				1
Strigidae	**Owls**															
Aegolius acadicus	N. Saw-whet owl									❍	❍	❍				1
Otus asio	Eastern screech owl				❍	❍	❍		❍	❍	❍	❍		X		1, 10, D6
Otus kennicottii	Western screech owl						❍			❍						6, 9
NONPASSERINE LAND BIRDS																
Apodidae	**Swifts**															
Chaetura pelagica	Chimney swift								❍							D55

SCIENTIFIC NAME	COMMON NAME	GND HABITATS: Beach, Dune Strand	Estuarine	Active Sand	Foredune	Dune Swale	Coastal Dune Scrub	Riverine	BLC HABITATS: Wetlands	Riparian	Oak Woodland	Eucalyptus Forest	Agriculture-Orchards	Industrial	LEGAL STATUS	REFERENCE SOURCES
PASSERINE (Perching) BIRDS																
Tyrannidae	**Tyrant Flycatchers**															
Empidonax alnorum	Alder flycatcher									❍						10
Empidonax trailii extimus	Southwestern willow flycatcher						❍	❍		❍			❍		FE, SE, y	9, D6
Corvidae	**Crows, Ravens, Jays**															
Pica nuttalli	Yellow-billed magpie								⇖	⇖	⇖	⇖				1
Ptilogonatidae	**Silky-flycatchers**															
Phainopepla nitens	Phainopepla				❍	❍	❍			⇖	⇖	⇖				1, 9, 10
Vireonidae	**Vireos**															
Vireo cassinii	Cassin's Vireo									⇖						MCAS
Parulidae	**Wood Warblers**															
Dendroica discolor	Prairie warbler									⇖						TE
Helmitheros vermivorus	Worm-eating warbler															MCAS
Icteridae	**Blackbirds, Orioles**															
Icterus galbula	Baltimore Oriole									❍						D99
Emberizidae	**Sparrows, Towhees, Juncos**															
Amphispiza belli belli	Bell's sage sparrow				❍	❍	❍								SC	
Amphispiza bilineata	Black-throated sparrow				❍	❍	❍									TE
Aimophila ruficeps	Rufous-crowned sparrow						❍									9
Pooecetes gramineus	Vesper sparrow				❍		❍		❍							1, 10
Cardinalidae	**Grosbeaks, Buntings**															
Guiraca caerules	Blue grosbeak						❍			❍						9
Passerine amoena	Lazuli bunting				❍	❍	❍		❍	❍						1, 9, 10

* Not expected, no longer occurs or extripated

REFERENCE SOURCES

Code	Author	Code	Author
1	Smith, et al. 1976	D3	Erickson, RA; Hamilton. 1998
6	UNOCAL 2000-2004 QEMRs	D6	McClelland Engineers, Inc. 1988
9	Entrix Inc. 1996	D9	CBRC Database 2004
10	Dames & Moore 1979	D10	CDFG. 2004. Rare Find
11	Burton; Kutilek 1991	D55	Lehman 1994
12	Kutilek; Shellhammer; Bros 1991	D99	Marantz 1986
		MCAS	Morro Coast Audubon Society
	Personal Communication		
MS	M Smith	JAS	Julie Schneider
TE	Tom Edell	WW	Walter Wehtje

HABITAT and LEGAL STATUS LEGEND

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✎	Most likely occurrence or anecdotal obs from pers. comm.
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SC	Califorinia Dept Fish & Game Species of Concern
FSS	US Forest Service (Region 5) Sensitive Species
FE	Federally Endangered Species
FT	Federally Threatened Species
y	Audubon yellow listed
r	Audubon red listed
SE	California Endangered
ST	California Threatened

APPENDIX E

Confirmed and Unconfirmed Mammal Taxa

SCIENTIFIC NAME	COMMON NAME	Beach, Dune Strand	Estuarine	Active Sand	Foredune	Dune Swale	Coastal Dune Scrub	Riverine	Wetlands	Riparian	Oak Woodland	Eucalyptus Forest	Agriculture	Industrial	LEGAL STATUS	REFERENCE SOURCES
		GND HABITATS							BLC HABITATS							
CONFIRMED MAMMAL TAXA																
MARSUPIALA	**POUCHED MAMMALS**															
Didelphis virginiana	Virginia opossum	○	●		●	●	●		●	●	●	●				1, 9, 10, D6
INSECTIVORA	**INSECT-EATERS**															
Sorex ornatus	Ornate shrew				●	●	●		●	●	●	●			SC	1, 9, 11
Scapanus latimanus	Broad-footed mole					●			●	●	●	●				1, 9, 10
CHIROPTERA	**BATS**															
Myotis spp. ?	Unidentified bat				○	○	○									6
CARNIVORA	**MEAT EATING**															
Ursus americanus	Black bear				●	●									LC	CB
Procyon lotor	Raccoon	●	●		●	●	●	●	●	●	●	●				1, 6, 9, 10, 11, 12
Mephitis mephitis	Striped skunk	●			●	●	●	○	○	●	●	●				1, 6, 10, 11, 12
Mustela frenata	Long-tailed weasel				●	●	●	○	○	●	●	●				1, 6, 9, 11, 12, D6
Spilogale gracilus	Western spotted skunk				●	●	●	○	○	●	●	●				1, 10
Taxidea taxus	American badger				●	●	●			●	●	●			LC	1, 6, 9, 11
Canis latrans	Coyote	●	●	●	●	●	●		●	○	●	●		●		1, 6, 10, 11, 12, D6
Urocyon cinereoargenteus	Gray fox	●			●	●	●	○	●	●	●	●				1, 6, 10, 11, 12
Lynx rufus	Bobcat	●		○	●	●	●	●	●	●						1, 6, 9, 11
Puma (Felis) concolor	Mountain lion					○	○	●	○	●					LC	CB, TT05
RODENTIA	**GNAWING MAMMALS**															
Spermophilus beecheyi	California ground squirrel				●	●	●		●	●				●		1, 9, 10, D6
Thomomys bottae	Botta's pocket gopher	●			●	●	●		●	●	●	●				1, 6, 9, 10, D6
Chaetodipus californicus	California pocket mouse				●	●	○			○						1, 9, 12
Dipodomys agilis	Pacific kangaroo rat					○	●			○						9
Dipodomys heermanni	Heermann's kangaroo rat				●	●	●			●	●	●				1, 6, 9, 10, 12
Castor canadensis	American beaver							●	●	●						1, JB
Reithrodontomys megalotis	Western harvest mouse		●		●	●	●		●	●						1, 9, 12
Peromyscus californicus	California mouse				●	●	●		○	●	●	●				1, 9, 10, 12
Peromyscus maniculatus	Deer mouse	●	●		●	●	●		●	●	●	●				1, 6, 9, 10, 12
Neotoma fuscipes	Dusky-footed wood rat				●	●	●		●	●	●	●				1, 6, 9, 10, 11, 12, D6
Microtus californicus	California vole (meadow mouse)				●	●	●		●	●						1, 9, 10, 12
Ondatra zibethica	Common muskrat							●	●	●						1, 9, 10, 11
Mus musculus	House mouse					●	●		●	●				○		1, 9
Mus spp.?	Unidentified mice					●										6
Rattus rattus	Black rat				●	●	●		●	●				●		1, 12
Lepus californicus	Black tailed jackrabbit (hare)	●			●	●	●		○	●	●	●				1, 6, 9, 11, 12, D6
Sylvilagus audubonii	Desert (Audubon's) cottontail				●	●	●			●	●	●				1, 6, 10, 12, D6
Sylvilagus bachmani	Brush rabbit	●			●	●	●			●	●	●				1, 6, 9, 10, 11, D6
Sylvilagus spp.	Unidentified rabbit (Lagomorpha)						●									6
ARTIODACTYLA	**EVEN-TOED HOOFED MAMMALS**															
Odocoileus hemionus	Mule (black-tailed) deer	●			●	●	●	●	●	●	●	●				1, 6, 9, 10, 12, D6
36	Confirmed Species Count	11	5	2	27	32	30	10	25	30	19	19	0	4		

REFERENCE SOURCES

Code	Author	Code	Author
1	Smith, et al. 1976	D6	McClelland Engineers, Inc. 1988
6	UNOCAL 2002	D11	Pierson et al. 2002
9	Entrix Inc. 1996	CB	Chris Barr NWR pers comm '04
10	Dames & Moore 1979	JB	Jim Blecha pers. comm. '04
11	Burton; Kutilek 1991	PC	P. Collins SBNHM pers. comm. '04
12	Kutilek; Shellhammer; Bros 199	TT05	Telegram-Tribune (SLO, CA) 1 May '05

HABITAT and LEGAL STATUS LEGEND

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	Most likely occurrence or anecdotal obs from pers comm
FSC	US Fish & Wildlife Species of Concern, Sacramento Offic
SC	California Dept Fish & Game Mammal Species of Concer
FSS	US Forest Service (Region 5) Sensitive Species
FE	Federally Threatened Species
FT	Federally Endangered Species
LC	Local Concern

		GND HABITATS							BLC HABITATS							
SCIENTIFIC NAME	**COMMON NAME**	**Beach, Dune Strand**	**Estuarine**	**Active Sand**	**Foredune**	**Dune Swale**	**Coastal Dune Scrub**	**Riverine**	**Wetlands**	**Riparian**	**Oak Woodland**	**Eucalyptus Forest**	**Agriculture**	**Industrial**	**LEGAL STATUS**	**REFERENCE SOURCES**
UNCONFIRMED MAMMAL TAXA																
INSECTIVORA	**INSECT-EATERS**															
Sorex trowbridgii	Trowbridge's shrew				❍	❍			❍	❍	❍	❍				1, 10
Sorex vagrans	Vagrant shrew									❍	❍	❍				D6
CHIROPTERA	**BATS**															
Antrozonus pallidus	Pallid bat		❍			❍	❍	❍	⬁	⬁	⬁	⬁		❍	SC, FSS	, 6, 9, 10, D11, P
Corynorhinus townsendii	Townsend's big-eared bat		❍			❍	❍	❍	⬁	⬁	⬁	❍		❍	FSC, SC, FSS	, 6, 9, 10, D11, P
Eptesicus fuscus	Big brown bat		❍		⬁	⬁	⬁	❍	❍	❍	❍	❍		❍		1, 9, 10, D11, PC
Lasionycteris noctivagans	Silver haired bat									❍		❍				D11, PC
Lasiurus blossevillii	Red bat		❍			⬁	❍	❍	❍	⬁	❍	❍		❍	SC, FSS	1, 9, 10, D11, PC
Lasiurus cinereus	Hoary bat		❍			❍	❍	❍	❍	❍	❍	❍		❍		1, 9, 10, D11, PC
Myotis californicus	California myotis		❍		⬁	⬁	⬁	❍	❍	❍	❍	❍		❍		1, 9, 10, D11, PC
Myotis evotis	Long-eared mytois		❍			❍	❍	❍	❍	❍	❍	❍		❍		1, 9, 10
Myotis subulatus	Small-footed myotis		❍			❍	❍	❍	❍	❍	❍	❍		❍		1, 9, 10
Myotis thysanodes	Fringed myotis		❍			❍	❍	❍	❍	❍	❍	❍		❍		1, 9, 10
Myotis volans	Long-legged mytois		❍			❍	❍	❍	❍	❍	❍	❍		❍		1, 9, 10
Myotis yumanensis	Yuma myotis		⬁		❍	⬁	❍	❍	⬁	⬁	❍	❍		❍	FSC	1, 9, 10, D11, PC
Pipistrellus hesmerus	Western pipistrelle		❍			❍	❍	❍	❍	❍	❍	❍		❍		1, 9, 10, D11
Eumops perotis	Western mastiff bat					❍	❍	❍	❍	❍				❍	FSC, SC	6, 9, D11, PC
Tadarida brasiliensis	Brazilian freetail bat		❍		⬁	⬁	⬁	❍	❍	❍	❍	❍	❍	❍		1, 9, 10, D11, PC
CARNIVORA	**MEAT EATING**															
Bassariscus astutus	Ringtail					❍		❍		❍						1, 9, 10
RODENTIA	**GNAWING MAMMALS**															
Sciurus griseus	Western gray squirrel									❍	❍	❍				1, D6
Tamias merriami	Merriam's chipmunk				❍	❍	❍			❍	❍	❍				1, 9, 10
Dipodomys venustus	Narrow-faced kangaroo rat				❍	❍	❍				❍	❍				1
Peromyscus boylii	Brush mouse					❍					❍	❍				1, D6
Peromyscus truei	Pinion mouse					❍					❍	❍				1
Rattus norvegicus	Norway rat					❍	❍		❍	❍				❍		1, 9, 10, D6
24	Unconfirmed Species Count	0	13	0	6	20	17	15	15	20	19	20	1	15		

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6	UNOCAL 2002	D11	Pierson et al. 2002
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APPENDIX F

Species Count

Table 1. Numbers of wildlife species reported in six studies conducted between 1976 to 2004 in the Guadalupe-Nipomo Dunes compared to the number of species compiled for this report. Included are numbers of plants.

Author	#1	#6	#9	#10	#11	#12	Blecha 2005	
Area of Study	Santa Maria River Mouth to Pismo Marsh	Guadalupe Oil Field	Guadalupe Oil Field	Guadalupe Oil Field	Oso Flaco Lake	PDSVRA	Pt. Sal to Pismo Beach	
Habitats Surveyed	Beach, Dune, Wetland, Riparian, Woodland	Beach, Dune, Wetland	Marine, Beach, Dune, Wetland, Riparian	Beach, Dune, Willow Riparian	Dune, Wetland, Riparian	Dune Swale Dune Scrub	Beach, Dune, Wetland, Riparian, Oak Woodland	
Data Types Presence-absence (**±**) Relative abundance (**RA**) Total number (□)	**±** Only birds & mammals assigned habitats	**±** **RA** for Fed & State listed spp. in habitats	**±** All wildlife assigned habitats	**RA** All wildlife assigned habitats	□ birds; **RA** herptiles & mammals. No habitat information	□ each vertebrate No habitat information.	Confirmed presence in habitats compiled from multiple authors	Unconfirmed in GND habitats
Status of Data	**CONFIRMED**	**CONFIRMED & Compiled**	**CONFIRMED & Compiled**	**CONFIRMED**	**CONFIRMED**	**CONFIRMED**	**CONFIRMED**	**Unconfirmed**
Plant	238	284	300	173	ND	90	ND	ND
Amphibian	10	6	5	3	4	3	8	4
Reptile	21	20	13	7	8	4	21	5
Bird	200	189	148	140	151	176	303	39
Terrestrial	146	136	100	97	108	146	229	28
Ocean-Shoreline	54	53	48	43	43	30	74	11
Mammal (terrestrial)	50	19	46	18	12	15	36	24
Fish	ND	2	17	9	ND	ND	10	0
Freshwater-Brackish	5	2	10	8	ND	ND	10	0
Marine	0	(1)	7	1	ND	ND	0	0
Invertebrate	25	ND	176	24	ND	ND	332	0
TOTAL ANIMALS	**306**	**236**	**405**	**201**	**175**	**198**	**710**	**72**

ANNOTATED REFERENCE SOURCES

CHECK BIRD TOTALS

Code	Author (faunal notes)
1	Smith, et al. 1976 (includes 12 bat spp; zooplankton and aquatic invertebrates)
6	UNOCAL 1999-2004 (observations during Western snowy plover and California least tern monitoring)
9	Entrix Inc. 1996 (includes 11 bat spp.;fish census; invertebrates from dip net & core samples)
10	Dames & Moore 1979 (aquatic invertebrates)
11	Burton; Kutilek 1991(circular plots for birds; pit traps for herptiles; incidental obs. for mammals)
12	Kutilek; Shellhammer; Bros 1991 (observation, trapping, detection of sign and night spotlighting over 4 seasons)

APPENDIX G

Fish

There are few fish studies for the GND. We included a list of known fish species as a starting point for future studies and to make this document more complete. The species list is mainly from a 1979 Guadalupe Oil Field survey and a 1996 consultant report covering ponds on the oil field and the lower reaches of the Santa Maria River. Many of these species were confirmed by an ongoing fish survey of the lower reaches of Arroyo Grande Creek.

Scientific name	*Common name*	*Reference*	*Species status*
Family Cyprinidae			
Gila orcutti	Arroyo chub	1	
Pimephales promelas	Fathead minnow	2	
Carassius aurtus	Goldfish	1,2	
Rhinichthys osculus	Speckled dace	1	
Hesperoleucus symmetri	California roach	1,3	
	California roach and Arroyo c	1	
Family Ictaluridae			
Ameiurus melas	Black bullhead	1,2	
Family Gasterosteidae			
Gasterosteus aculeatus	Three-spined stickleback	1,2,3,4	
Family Cottidae			
Leptocottus armatus	Pacific staghorn sculpin	1,2,3	
Cottus asper	Prickly sculpin	1,2,3	
Family Gobiidae			
Eucyclogobius newberryi	Tidewater goby	1,2,3	federally endangered
Family Poeciliidae			
Gambusia affinis	Mosquitofish	1,2,3,4	
Family Plueronectidae			
Platichthys stellatus	Starry flounder	1,2,3	
Family Centrarchidae			
Micropterus salmoides	Largemouth bass	1,2,3,4	
Lepomis macrochirus	Bluegill	1,2,3,4	
Pomoxis nigromaculatus	Black crappie	1,2	
Lepomis cyanellus	Green sunfish	1	
Family Salmonidae			
Oncorhynchus mykiss	Rainbow trout	1	
Oncorhynchus mykiss	Steelhead trout	3	federally threatened a
Family Catostomidae			
Catostomus occidentalis	Sacramento sucker	3	
Family Atherinidae			
Atherinops affinis	Topsmelt	3	

Ref. No.	Reference
1	Dames and Moore. 1979. Biological Investigations-Guadalupe O
2	Entrix, Inc. 1996. Preliminary assessment of habitats and biologi
3	Rischbieter, Douglas. 2006. Lower Arroyo Grande Creek and La
4	Smith. K. 1976. The Natural Resources of The Nipomo Dunes a

APPENDIX H

Marine taxa

The following appendix documents the taxa of marine animals known to occur in the intertidal or shallow nearshore waters of the Guadalupe-Nipomo Dunes, in the area roughly between Point Sal, Santa Barbara County and the Pismo Pier, San Luis Obispo County. These marine animals include 120 taxa of marine invertebrates (e.g. sponges, crustaceans, mollusks, and echinoderms), 31 marine fish species, 4 reptile (turtle) species and 26 marine mammal species. These animals are included here to make this report a more complete compilation of the animals known to occur in and around the GND. The primary reference source for these is the final environmental impact report for the Guadalupe Oil Field (ADL 1998).

Readers are encouraged to consult ADL (1998) for a more complete description of the various studies pertinent to the marine biological resources of the GND.

INVERTEBRATES		
Protozoa		
Ceratium sp.		3
Globigerina sp.		3
Gyrodinium glaucans		3
Noctoluca scintilla		3
Micro-flagellates		3
Radiolarian		3
tintinnids		3
Porifera (sponges)		
Acarnus spp.	Red volcano sponge	7
Leucilla nuttingi	Vase sponge	7
Spheciospongia confoederata	Gray moon sponge	7
Coelenterata (Hydroids & anemones)		
Agalophenia struthionoides	Ostrich-plume hydroid	7
Anthopleura aretmisia	Moonglow anemone	7
A. elegantissima	Aggregating anemone	7
Corynactis claifornica	Strawberry anemone	
Epiactis prolifera	Proliferating anemone	7
Obelia spp.	hydroids	7
Nemertea (smooth worms)		
Nemertea sp.		5
Paranemertes californica		5
Annelida (segmented worms)		
Chaetozone sp.		10
Diopatra ornate	Ornate tube worm	8
Dispio uncinata		10
Eteone dilatae		5
Euclymeninae sp.		10
Euzonus dillonensis		5
Euzonus mucronata		5,10
Glycera convoluta		10
Hemipodus californiensis		5
Heteromastus sp.		10
Magelona sacculata		10
Myxicola infundibulum	Polychaete	8
Nephtys cf. *caecoides*		10
Nepthys californiensis		5
Netphys sp.		5
Notomastus latericeus		10

Phragmatopoma californica	Colonial tube worm	8
Polydora bioccipitalis		10
Pygospio californica		5
Sabella crassicornis	Feather-duster worm	8
Scoloplos acmeceps		5
Scoloplos armiger		5,10
Serpula vermicularis	Tube worm	8
Zygeupolia rubens		5
Lumbrineridae		5
Opheliidae		5
Orbiniidae		5
Urochordata (tunicates or sea quirts)		
Cnemidocarpa finmarkiensis	Broad-base tunicate	8
Suherdmania claviformis	Sand club tunicate	8
Pyura haustor	Solitary tunicate	8
Ritterella aequalisiphonis	Colonial/social tunicate	8
Styela montereyensis	Stalked tunicate	8
Crustacea (crabs, barnacles, amphipods, copepods, isopods)		
Alpheus sp.		10
Archaeomysis grebnitzke		5
Balanus spp.	Barnacles	8
Blepharipoda occidentalis	Spiny mole crab	7
Cancer antennarius	Red rock crab	8
Cancer gracilis	Slender cancer crab	7
Corophium baconi		10
Corycaeus affinis	Copepod	3
Crangon nigricauda	Shrimp	7
Emerita analoga	Sand crab	5
Eohaustorius sawyeri		5
Eohaustorius sencillus		10
Eohaustorius spp.		6
Eohaustorius washingtonianus		5
Eucalanus elongate	Copepod	3
Excirolana linguifrons	Isopod	6
Excirolana chiltoni		5
Isocheles pilosus	Hermit crab	7
Lepidopa californica		5
Lepidopa californica		10
Lissocrangon stylirostris		10
Listriella sp.		10
Loxorhynchus spp.	Sheepcrab	7
Mandibulophoxus gilesi	Amphipod	6,10
Megalorchestia columbiana	Beach hoppers	6
Megalorchestia pugettensis	Beach hopper	6
Microcalanus pusillus	Copepod	3
Microsetella norvegica	Copepod	3

Monoculodes spinpes		10
Pagurus spp.	Hermit crab	8
Pseudocalanus minutus	Copepod	3
Rhepoxynius menziesi		10
Rhepoxynius spp.		10
Scyra acutifrons	Sharp-nosed crab	8
Synchelidium shoemakeri	Amphipod	6,10
Synchelidium sp.		5
Barnacle nauplii		3
Crab zoeae		3
Unidentified copepods		3
Unidentified nauplii		3
Mollusca (clams, snails, limpets, nudibranchs)		
Acmaea mitra	White cap limpet	8
Anisodoris nobilis	Speckled sea lemon	8
Calliostoma annulatum	Purple-ringed top snail	8
Calliostoma ligatum	Ribbed top snail	8
Dendronotus albus	Nudibranch	8
Diodora aspera	Keyhole limpet	8
Flabellina iodinea	Spanish shawl	8
Hermissenda crassicornis	Aeolid nudibranch	8
Hinnites giganteus	Rock scallop	8
Moplaia hindsii	Chiton	8
Nassarius fossatus		3,4,7,10
Nassarius perpinguis		10
Octopus spp.	Octopus	7
Olivella biplicata	Olive snail	3,4,7
Olivella pycna	Olive snail	10
Polynices lewisii	Moon snail	7
Siliqua patula		5
Tellina bodegensis		10
Tellina modesta		10
Tivela stultorum	Pismo clam	11
Echinodermata (sea urchins, sea stars)		
Asterina miniata	Bat star	8
Astropecten armatus	Sand sea star	7
Cucumaria spp.	Sea cucumber	8
Dendraster excentricus	Sand dollar	3,4,7,10
Ophiopteris papillosa	Brittle star	8
Pisaster brevispinis	Short-spined sea star	3,4,7,8
Pisaster giganteus	Giant-spined sea star	8
Pisaster ochraceus	Ochre sea star	8
Strongylocentrotus franciscanus	Red sea urchin	8
Strongylocentrotus purpuratus	Purple sea urchin	8

VERTEBRATES		
Fishes		
Allosmerus elongates	Whitbait smelt	2
Amphistichus argenteus	Barred surfperch	2
Artedius notospilotus	Padded sculpin	2
Citharichthys sordidus	Pacific sanddab	2
Citharichthys stigmaeus	Speckled sanddab	2,7
Cymatogaster aggregata	Shiner surfperch	2
Damalicthys vacca	Pile perch	7,8
Embitoca lateralis	Striped surfperch	7
Genyonemus lineatus	White coraker	2
Heperprosopon anale	Spotfin surfperch	2
Hexagrammos decagrammus	Kelp greenling	7
Loptocottus armatus	Staghorn sculpin	2
Oligocottus spp.	Sculpin	7
Ophiodon elongatus	Lingcod	2
Orthanopias triacis	Snubnose sculpin	7
Oxylebius pictus	Convict fish	7
Paralicthys californicus	California halibut	7
Parophrys vetulus	English sole	2
Platyrhinoidis triseriata	Thornback ray	7
Pleuronichthys coenosus	C-O turbot	2,7
Psettichthys melanostrictus	Sand sole	2
Scorpaenichthys marmoratus	Cabezon	7
Sebastes auriculatus	Brown rockfish	7
Sebastes carnatus	Gopher rockfish	7
Sebastes chrysomelas	Black and yellow rockfish	7
Sebastes mystinus	Blue rockfish	7
Sebastes spp.	Rockfish	2
Seriphus politus	Queenfish	2
Stellerina xyosterna	Pricklebreast poacher	2
Sygnathus spp.	Pipefish	2
Torpedo californica	Torpedo ray	7
Reptiles		
Chelonia mydas	Green sea turtle	9
Lepidochelys olivacea	Pacific ridley turtle	9
Dermochelys coriacea	Leatherback turtle	9
Caretta caretta	Loggerhead turtle	9

Mammals		
Pinnipeds (seals, sea lions)		
Arctocephalus townsendi	Guadalupe fur seal	9
Callorhinus ursinus	Northern fur seal	9
Eumatopias jubatus	Stellar sea lion	9

Mirounga angustirostris	Northern elephant seal	9
Phoca vitulina	Harbor seal	9
Zalophus californianus	California sea lion	9
Fissipeds (otters)		
Enhydra lutris	Southern sea otter	9
Cetaceans (whales, dolphins)		
Balaenoptera acutorostrata	Minke whale	9
Balaenoptera musculus	Blue whale	9
Balaenoptera physalus	Fin whale	9
Balenoptera borealis	Sei whale	9
Delphinus delphis	Common dolphin	9
Eschrictius robustus	California grey whale	9
Globicephala macrorhynchus	Short-finned pilot whale	9
Grampus griseus	Risso!s dolphin	9
Lagenorhynchus obliquidens	Pacific white-sided dolphin	9
Lissodelphis borealis	Northern right whale dolphin	9
Megaptera novaengliae	Humpback whale	9
Orcinus orca	Killer whale	9
Phocoena phocoena	Harbor porpoise	9
Phocoenoides dalli	Dall!s porpoise	9
Physeter catadon	Sperm whale	9
Pseudorca crassidens	False killer whale	9
Stenella coeruleoalba	Striped dolphin	9
Tursiops truncates	Bottlenose dolphin	9
Ziphius cavirostris	Cuvier!s beaked whale	9
The occurrence of the following cetaceans within the waters off of the GND listed as possible (*1) according to the reference or they have been recorded from the Monterey Bay area (*2) according to the reference and therefore may occur off of the GND.		
Balaena glacialis (also *Eubalaena glacialis)* (*2)	Pacific right whale	12
Berardius dairdi (*2)	Baird!s beaked whale	12
Kogia breviceps (*2)	Pygmy sperm whale	12
Mesoplodon densirostris (*1)	Blainville!s beaked whale	9
Mesoplodon stejnegeri (*1)	Bering Sea beaked whale	9
Stenella attenuata (*1)	Spotted dolphin	9
Stenella longirostris (*1)	Spinner dolphin	9
Steno bredanensis (*1)	Rough-toothed dolphin	9

Ref. No.	Reference
1	Arthur D. Little, Inc. (ADL). 1998. Guadalupe Oil Field Remediation and Abandonment Project. Final Environmental Impact Report. Prepared for: County of San Luis Obispo, Department of Planning and Building. SCH # 96051053. March 1998
2	Rechnitzer, A., and C. Limbaugh. 1956. An oceanographic and ecological investigation of the area surround the Union Oil Company, Santa Maria Refinery Outfall, Oso Flaco, California. Prepared for the State Water Pollution Control Board, Standard Service Agreement No. 12D-15 by the University of California, Institute for Marine Resources, La Jolla California. IMR Ref 56-5. 46pp. ______. 1959. An oceanographic and ecological investigation of the area surround the Union Oil Company, Santa Maria Refinery Outfall, Oso Flaco, California. Prepared for the State Water Pollution Control Board, Standard Service Agreement No. 12D-15 by the University of California, Institute for Marine Resources, La Jolla California. IMR Ref 59-13. 67 pp.
3	Clogston, F. 1970. A reinspection of the marine environment in the vicinity of the Union Oil Company Santa Maria Refinery, Oso Flaco, California. Prepared for the Central California Regional Water Quality Control Board. 39 pp.
4	Pimentel, R. 1959. An investigation of marine organism concentrations in the vicinity of the Union Oil Company Santa Maria Refinery outfall, Oso Flaco, San Luis Obispo County, California.
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6	Enterix, Inc. 1995. Guadalupe remediation project preliminary pre-construction supratidal, intertidal, and subtidal macroinvertebrate survey data report pursuant to California Coastal Commission Emergency Coastal Development Permit No. E-94-12, Condition 12. January 25, 1995. Prepared for Unocal Corporation, Orcutt, California Project No. 307411.
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	site. Prepared for The Nature Conservancy, June 1995. 8pp.
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11	Smith, K., J. Speth, and B, Browning. 1976. The Natural Resources of the Nipomo Dunes and Wetlands. Prepared for the Department of Interior, U.S. Fish and Wildlife Service, Office of Biological Services. June, 1976. 106 pp + appendices.
12	www.montereybay.noaa.gov/Intro/mbnms_eis/images/table09.jpg