

North County Subarea Plan (NCSAP) Species Targeted for Conservation

1.0 LIST OF TARGETED SPECIES

Common Name	Scientific Name
PLANTS	
San Diego Thornmint	<i>Acanthomintha ilicifolia</i>
San Diego adolphia	<i>Adolphia californica</i>
San Diego ambrosia	<i>Ambrosia pumila</i>
Aphanisma	<i>Aphanisma blitoides</i>
Del Mar Manzanita	<i>Arctostaphylos glandulosa crassifolia</i>
Rainbow manzanita	<i>Arctostaphylos rainbowensis</i>
Encinitas Baccharis	<i>Baccharis vanessae</i>
Nevin's barberry	<i>Berberis (=Mahonia) nevinii</i>
Thread-leaved brodiaea	<i>Brodiaea filifolia</i>
Orcutt's brodiaea	<i>Brodiaea orcuttii</i>
Wart stemmed ceanothus	<i>Ceanothus verrucosus</i>
Orcutt's Spineflower	<i>Chorizanthe orcuttiana</i>
Summer holly	<i>Comarostaphylis diversifolia diversifolia</i>
Blochman's Dudleya	<i>Dudleya blochmaniae ssp. blochmaniae</i>
Short-leaved Dudleya	<i>Dudleya blochmaniae ssp. brevifolia</i>
Sticky (-leaved) dudleya	<i>Dudleya viscida</i>
San Diego button-celery	<i>Eryngium aristulatum parishii</i>
Cliff spurge	<i>Euphorbia misera</i>
Coast barrel cactus	<i>Ferrocactus viridescens</i>
Mojave tarplant	<i>Hemizonia mohavensis</i>
Southern tarplant	<i>Hemizonia parryi australis</i>
Heart-leaved pitcher sage	<i>Lepechinia cardiophylla</i>
San Diego goldenstar	<i>Muilla clevelandii</i>
Little mousetail	<i>Myosurus minimus apus</i>
Spreading (=Ditch) navarretia	<i>Navarretia fossalis</i>
Chapparal beargrass	<i>Nolina cismontana</i>
Nuttall's scrub oak	<i>Quercus dumosa</i>
Engelmann oak	<i>Quercus engelmannii</i>
San Miguel savory	<i>Satureja (=Calamintha) chandleri</i>
Gander's butterweed	<i>Senecio ganderi</i>
Parry's tetracoccus	<i>Tetracoccus dioicus</i>
INVERTEBRATES	
San Diego fairy shrimp	<i>Branchinecta sandeogoensis</i>
Riverside fairy shrimp	<i>Streptocephalus wootoni</i>
Quino checkerspot butterfly	<i>Euphydryas editha quino</i>
Dun skipper	<i>Euphyes vestris harbisoni</i>

Common Name	Scientific Name
Hermes copper	<i>Lycaena hermes</i>
FISHES	
Rainbow trout – steelhead form	<i>Oncorhynchus mykiss</i>
AMPHIBIANS	
Arroyo toad	<i>Bufo californicus</i>
California red-legged frog	<i>Rana aurora draytonii</i>
Western spadefoot toad	<i>Scaphiopus hammondi</i>
Coast Range newt	<i>Taricha torosa torosa</i>
REPTILES	
Southwestern pond turtle	<i>Clemmys marmorata pallida</i>
Orange-throated whiptail	<i>Cnemidophorus hyperythrus beldingi</i>
San Diego horned lizard	<i>Phrynosoma coronatum blainvillei</i>
BIRDS	
Cooper's hawk*	<i>Accipiter cooperi</i>
Tricolored blackbird*	<i>Agelaius tricolor</i>
Rufous-crowned sparrow	<i>Aimophila ruficeps canescens</i>
Grasshopper sparrow	<i>Ammodramus savannarum perpallidus</i>
Bell's sage sparrow	<i>Amphispiza belli belli</i>
Golden eagle	<i>Aquila chryseatos</i>
Burrowing owl*	<i>Athene cunicularia hypugaea</i>
Coastal Cactus wren	<i>Campylorhynchus brunneicapillus cousei</i>
Northern harrier*	<i>Circus cyaneus</i>
Western yellow-billed cuckoo*	<i>Coccyzus americanus occidentalis</i>
Southwestern willow flycatcher*	<i>Empidonax traillii extimus</i>
Peregrine falcon	<i>Falco peregrinus</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Yellow-breasted chat*	<i>Icteria virens auricollis</i>
Osprey*	<i>Pandion haliaetus</i>
White-faced ibis*	<i>Plegadis chihi</i>
Coastal California gnatcatcher	<i>Polioptila californica californica</i>
Light-footed clapper rail	<i>Rallus longirostris levipes</i>
Western bluebird	<i>Sialia mexicana</i>
California spotted owl	<i>Strix occidentalis occidentalis</i>
Least Bell's vireo	<i>Vireo bellii pusillus</i>
MAMMALS	
Stephens' kangaroo rat	<i>Dipodomys stephensi</i>
Ramona grasshopper mouse	<i>Onychomys torridus ramona</i>
Mountain lion	<i>Felis concolor</i>
Black-tailed jackrabbit	<i>Lepus californicus bennettii</i>
Southern mule deer	<i>Odocoileus hemionus</i>

2.0 SPECIES ACCOUNTS

The following accounts address the list of species identified for conservation under the North San Diego County Subarea Plan. The information provided for each species includes life history characteristics relevant to planning and conservation, general and local distributions, and other factors that will affect the conservation of these species. The purpose of this information is to aid in the interpretation of the GIS-based conservation analyses. These accounts are not uniform in the amounts and kinds of information included; therefore they will be subject to augmentation with new data and information as it becomes available.

PLANTS

SAN DIEGO THORN-MINT

Acanthomintha ilicifolia

USFWS: Candidate (Endangered)

CDFG: Endangered

CNPS rating: List 1B

Life History. This spring-blooming (April-May) annual plant occurs in clay depressions on mesas and slopes below 300 m (965 ft) elevation and is associated with coastal sage scrub, chaparral, and grassland.

Distribution, Abundance, and Trends. San Diego thorn-mint is restricted in distribution to San Diego County and northern Baja California, Mexico (Skinner and Pavlik 1994; USFWS 1998). In San Diego County, the species is known from Carlsbad and San Marcos south to Sweetwater, Otay Mesa, and east to the higher elevations on McGinty Mountain (Oberbauer 1979a, Wier 1986) and Alpine (Beauchamp 1986; USFWS 1998). This species' distribution is therefore largely south and west of the North County SAP area. Large populations occur in Carlsbad, Encinitas, San Marcos, Sycamore Canyon, Poway, the Lake Hodges area, El Capitan, and Jamul. Within the North County SAP, the species is found at the edges of San Marcos, Vista, Escondido, and Rancho Santa Fe (Reiser 1994). This species is restricted to calcareous marine sediments, clay, or gabbro-derived soils and is associated with coastal sage scrub, chaparral, and grassland.

An estimated 52 historic populations of this species are known in the United States, of which 32 populations are extant. The USFWS (1998) estimates that these 32 populations support 150,000 to 170,000 individuals and occupy approximately 400 acres. According to the USFWS (1998), about 60% of the estimated individuals occur in four major populations that are found to the south of the North County study area.

Threats and Limiting Factors. Threats to this species include cumulative habitat loss and degradation, trampling, vehicular traffic and road construction, illegal dumping, livestock grazing, invasive exotic plants, collecting, edge effects, and, possibly, genetic isolation and herbivory (Skinner and Pavlik 1994; USFWS 1998).

Special Considerations. San Diego thorn-mint is an annual plant that may experience yearly fluctuations in population size and location. This species appears to be an outcrosser that is insect-pollinated (e.g., bees, Wyatt 1983), and may rely on animal vectors, in part, for seed dispersal. This species also appears to be susceptible to both fire damage (USFWS 1998) and soil surface disturbance. The level of survey effort for this species in the study area is considered relatively high; however, annual plants germinate in response to specific climatic conditions, so this species could be missed during a poor survey year.

SAN DIEGO ADOLPHIA

Adolphia californica

CNPS rating: 2

Life History. This low, spiny shrub blooms in late winter through mid-spring. It sheds its tiny leaves in the summer (McMinn 1939). San Diego adolphia is a component of dry, southern coastal sage scrub (Reiser 1994).

Distribution, Abundance, and Trends. San Diego adolphia is restricted to San Diego County and northern Baja California, Mexico. Its distribution is discontinuous, often locally abundant, but with wide separation among local populations. North of the border it is found most commonly from Agua Hedionda Creek and Calavera Lake in Carlsbad to San Marcos, southward through Rancho Santa Fe, the San Dieguito River, Black Mountain to the Sweetwater – Otay area, where it is particularly widespread. A few locations are as far north as Oceanside and Vista. Most of the distribution appears to be west of Interstate 15 (Reiser 1994). The distribution within the North County SAP area appears to be peripheral, perhaps limited to Rancho Santa Fe and the edges of Vista and San Marcos (Reiser 1994).

Threats and Limiting Factors. Threats to San Diego adolphia include primarily urbanization and associated edge effects (including invasive exotic plants), although it benefits in some ways from open vegetation conditions. Little is known of response to fire, but it recovers fairly well from mechanical disturbance (Lovio pers comm.).

Special Considerations. None identified.

SAN DIEGO AMBROSIA

Ambrosia pumila

USFWS: FSC

CNPS rating: List 1B

Life History. San Diego ambrosia is an herbaceous, summer-blooming (May-October) species that occurs in valleys or disturbed areas below 150 m (470 ft) in southwestern San Diego County and northern Baja California.

Distribution, Abundance, and Trends. San Diego ambrosia is restricted to western Riverside County, southwestern San Diego County, and northern Baja California, Mexico (Skinner and Pavlik 1994; Wiggins 1980; USFWS 1999). In San Diego County, the species has been reported from scattered locations along or adjacent to the San Luis Rey, San Diego, and Sweetwater rivers. It is scarce in the north-inland county, with reports from only two sites on the San Luis Rey River above Bonsall (Reiser 1994). This species is typically associated with upper terraces of rivers and drainages, but is also found in open coastal sage scrub, grassland, or disturbed habitats.

The USFWS, in their notice of 90-day petition finding and initiation of status review for this species, provides the following account of historic and current distribution for San Diego ambrosia (USFWS 1999). This account is based, in part, on information provided in the petition to list this species as federally endangered (Southwest Center for Biological Diversity and CNPS 1996). Approximately 53 historic and extant populations of San Diego ambrosia have been documented throughout the species' range. Of this total, 48 populations have been reported from San Diego County, 2 populations occur in Riverside County, and 3 populations are known from Baja California. Of the 48 San Diego County populations, 23 are extirpated, 11 have been recently determined to be misidentifications, and 14 are extant. Two of the extant populations, however, were transplanted from donor sites and their long-term viability is considered questionable. Of the remaining 12 populations, 11 have been recently verified as extant and the other is considered (but not verified) as extant. The long-term viability of 5 of the 11 verified extant populations is considered questionable due to one or more factors, including small population size; habitat loss, degradation, or fragmentation; current land use practices; and land ownership.

Threats and Limiting Factors. Threats to this species include primarily urbanization and associated edge effects (including invasive exotic plants). San Diego ambrosia may be adversely affected by fire and competition from other plants and appears vulnerable to random environmental or demographic events (USFWS 1999).

Special Considerations. San Diego ambrosia is a wind-pollinated perennial herb (Hickman 1993). This species also reproduces asexually by rhizomes, and transplantation/reintroduction of rhizomes may be an effective method of enhancing populations (PSBS 1995). San Diego ambrosia presumably relies on animal vectors, in part, for seed dispersal, and is possibly tolerant of some soil surface disturbance. The level of survey effort for this species in the study area is considered relatively low due

primarily to (1) the difficulty of identifying this species when not in fruit and (2) timing of survey efforts (e.g., many surveys are conducted in spring or early summer, whereas ambrosia blooms in late summer and fall).

APHANISMA

Aphanisma blitoides

CNPS: List 1B

Life History. *Aphanisma* is a glabrous, succulent, spring-blooming (April-May) annual that occurs along the coastal strand or on bluffs in coastal sage scrub.

Distribution, Abundance, and Trends. Historically, this species occurred from Los Angeles County southward to Baja California, and on most of the Channel Islands. It is now apparently extirpated in the northern end of its range (Smith and Berg 1988). In San Diego County, *aphanisma* occurs in alkaline areas along the coast below 25 m (82 ft.) elevation. Reported localities include San Onofre, San Dieguito Creek, the Silver Strand, Imperial Beach (Beauchamp 1986), and possibly Torrey Pines State Park and Point Loma (Oberbauer pers. comm.). This species historically occurred in La Jolla (Beauchamp 1986) as well.

Threats and Limiting Factors. Loss, fragmentation, and degradation of remaining unaltered coastal bluffs and dunes (Reiser 1994).

Special Considerations. Alkaline soil preference. Little is known of its growing conditions (Reiser 1994).

DEL MAR MANZANITA

Arctostaphylos glandulosa crassifolia

USFWS: Proposed Endangered

CNPS rating: 1B

Life History. This coastally restricted shrub grows on rocky slopes and ridges and is a localized component of maritime chaparral (Reiser 1994). It blooms in late winter and spring (Munz 1968).

Distribution, Abundance, and Trends. This subspecies is restricted to western San Diego County and northern Baja California, Mexico. Within San Diego County it occurs mostly southward from Encinitas and Rancho Santa Fe, generally within 5 miles of the coast (the identity of scattered inland locations in the vicinity of Highway 15 are suspect). It may occur as far north as Oceanside (Reiser 1994). The Del Mar manzanita is only likely to occur within the North County SAP area in Rancho Santa Fe.

Threats and Limiting Factors. Threatened by further fragmentation and loss of range from expanding urbanization in coastal communities (Reiser 1994).

Special Considerations. Coastally restricted in sandy or rocky soils. Responds to fire by crown-sprouting (McMinn 1939), but effects of repeated burning may not be known.

RAINBOW MANZANITA

Arctostaphylos rainbowensis

CNPS rating: 1B

Life History. Not provided.

Distribution, Abundance, and Trends. Restricted to extreme northern San Diego and southwestern Riverside Counties, this shrub is a component of dense chaparral. Within San Diego County its distribution lies between the east end of Camp Pendleton and the Agua Tibia Mountains (Reiser 1994). This entire range is within the North County SAP area.

Threats and Limiting Factors. Orchard expansion in parts of its range (Reiser 1994).

Special Considerations. Soil specificity and fire response are not certain.

ENCINITAS BACCHARIS

Baccharis vanessae

USFWS: Proposed Endangered

CDFG: Endangered

CNPS rating: 1B

Life History. Not provided.

Distribution, Abundance, and Trends. This shrub is restricted to the central coastal region of San Diego County, from the Encinitas area eastward to Mount Israel and southward to Iron Mountain and Crest (Reiser 1994). It may occur within the North County SAP area only in the vicinity of Rancho Santa Fe.

Threats and Limiting Factors. Encinitas Baccharis is threatened by spreading development and fragmented populations.

Special Considerations. Apparently sprouts from burl following fire (Reiser 1994). This species is dioecious, which may have reproductive ramifications in locations where only scattered or isolated individuals remain, particularly near the coast (Reiser 1994).

NEVIN'S BARBERRY

Berberis nevinii

USFWS: Proposed Endangered

CDFG: Endangered
CNPS rating: 1B

Life History. Not provided.

Distribution, Abundance, and Trends. Restricted to chaparral slopes with desert affinity in Riverside, Los Angeles, Riverside, and possibly San Diego Counties. Occurrence of native stands in San Diego County have not been verified, but any possible occurrence would be within the North County SAP area (Reiser 1994).

Threats and Limiting Factors. Uncertain.

Special Considerations. None identified.

THREAD-LEAVED BRODIAEA

Brodiaea filifolia

USFWS: FE

CDFG: Endangered

CNPS rating: List 1B

Life History. Thread-leaved brodiaea is a spring-blooming (May) herbaceous perennial from a corm. It is presumably insect-pollinated (e.g., bees, Wyatt 1983), but also reproduces asexually by producing corm offsets.

Distribution, Abundance, and Trends. Thread-leaved brodiaea is known from interior valley areas of Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties (Skinner and Pavlik 1994). In San Diego County, the species has been reported from Camp Pendleton, Oceanside, Carlsbad, Vista, San Marcos, and the 4S Ranch. Within the North County SAP area, the species is peripheral, occurring on the edges of Oceanside, San Marcos, Vista, and Carlsbad (Reiser 1994). The majority of remaining populations of this species are concentrated on the Santa Rosa Plateau in western Riverside County and in the MHCP area (USFWS 1998). This species generally occurs in heavy clay soils, soils with clay subsoils in grasslands, or in vernal pools. Of the 46 reported populations of this species, 37 are presumed extant.

Threats and Limiting Factors. Threats to this species include urbanization, agriculture, disking for fire and weed control, vehicular traffic, and edge effects.

Special Considerations. Thread-leaved brodiaea is an herbaceous perennial from a corm. Transplantation/reintroduction of corms and corm offsets may be an effective way of enhancing populations (ERCE 1993). Seeds of this species are presumably self-dispersed. Thread-leaved brodiaea is often associated with wetland habitat. The level of survey effort for this species in the study area is considered relatively high; however, flowering of corm species depends on climatic conditions, so this species could be missed during a poor survey year.

ORCUTT'S BRODIAEA

Brodiaea orcuttii

USFWS: FSC

CNPS rating: List 1B

Life History. This herbaceous, spring-blooming (April-June), corm-forming perennial is found only in San Diego County and northern Baja California, where it occurs in association with vernal pools, streams, and seeps, often in grasslands.

Distribution, Abundance, and Trends. Orcutt's brodiaea is found over a wide elevational range in Orange, Riverside, and San Diego counties, and in northern Baja California, Mexico (Skinner and Pavlik 1994; Wiggins 1980). In San Diego County, the species is infrequent, occurring in coastal and foothill regions below 1,500-meter elevation. Reported localities include the Santa Margarita Mountains, Carlsbad, San Marcos, Carmel Mountain, Los Peñasquitos Canyon, Mira Mesa, Poway, Kearny Villa, Tierrasanta, Miramar Naval Air Station, Montgomery Field, La Mesa, Proctor Valley Creek, O'Neal Canyon, lower Otay Reservoir, Ramona, Henshaw Dam, Santa Ysabel, Cuyamaca Mountains, and Japatul (Beauchamp 1986; Ogden 1995; J. Brown pers. comm.). Within the North County SAP area, Orcutt's brodiaea is found in near Questhaven, above Agua Hedionda Creek, Ramona, and in Valley Center (Reiser 1994).

Threats and Limiting Factors. Threats to this species include development, vehicular traffic, road construction, illegal dumping, and edge effects.

Special Considerations. Orcutt's brodiaea is an herbaceous perennial from a corm and reproduces asexually by producing corm offsets. This species is presumably insect-pollinated as well (e.g., bees, Wyatt 1983) and seeds are presumably self-dispersed. Orcutt's brodiaea is often associated with wetland habitat. The level of survey effort for this species in the study area is considered relatively high; however, flowering of corm species depends on climatic conditions, so this species could be missed during a poor survey year.

WART-STEMMED CEANOTHUS

Ceanothus verrucosus

USFWS: FSC

CNPS rating: List 2, 1-2-1

Life History. Wart-stemmed ceanothus is an evergreen shrub found on dry hills and mesas in chaparral (Munz 1974) below 300 m (984 ft) elevation. This species is presumably insect-pollinated (e.g., bees or bee flies, Wyatt 1983; Conrad 1987), and seeds are self-dispersed (Keeley 1991).

Distribution, Abundance, and Trends. Wart-stemmed ceanothus is limited in distribution to western San Diego County and Baja California, Mexico (Skinner and Pavlik 1994). In San Diego County, it is found on the immediate coast from Carlsbad south to the U.S.-Mexican border and inland to eastern San Diego and Lake Hodges (Higgins 1949). It also occurs inland towards San Marcos and Lake Hodges. Within the United States, large populations occur in Carlsbad, Encinitas, Torrey Pines State Reserve, Carmel Mountain-Carmel Valley, San Marcos, Escondido, and Point Loma. Smaller populations are known from Kearny Mesa-Clairemont Mesa-Miramar, Soledad, and Spooner's Mesa. Because of its restriction to the lower coastal slope, this species is very restricted within the North County SAP area, perhaps occurring only in Rancho Santa Fe, the edges of San Marcos, and near Mount Israel (Reiser 1994). Wart-stemmed ceanothus is associated with southern maritime chaparral and southern mixed chaparral. It also forms nearly monotypic stands in some inland locations.

Threats and Limiting Factors. Threats to this species include development and associated edge effects (including fuel modification, fuel suppression, and invasion of nonnative plants).

Special Considerations. This is a highly fire-adapted species whose fire response is seed germination from a persistent seed bank after exposure to intense heat (e.g., an obligate seeder after fire) (Keeley 1991). The level of survey effort for this species in the study area is considered relatively high.

ORCUTT'S SPINEFLOWER

Chorizanthe orcuttiana

USFWS: Proposed Endangered

CDFG: Endangered

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

Life History. This prostrate, spring-blooming (March-April) annual is generally associated with coastal sage scrub or chaparral.

Distribution, Abundance, and Trends. Orcutt's spineflower is endemic to San Diego County and is found only in sandy areas on mesas in the coastal region. It has been reported from Encinitas, Del Mar, Pt. Loma, Torrey Pines State Reserve, and Kearny Mesa (Beauchamp 1986), but may persist only in Encinitas and Torrey Pines (Reiser 1994).

Threats and Limiting Factors. Most of the former range of the species has been converted to housing tracts, which remain the primary threat to its existence.

Special Considerations. None identified.

SUMMER-HOLLY

Comarostaphylis diversifolia ssp. *diversifolia*

USFWS: FSC

CNPS rating: List 1B 2-2-2

Life History. Summer-holly is a large, evergreen shrub generally found on north-facing slopes in chaparral below 700 m (2297 ft) elevation.

Distribution, Abundance, and Trends. This shrub's distribution is similar to that of Wart-stemmed Ceanothus. Summer-holly occurs in Orange, Riverside, and San Diego counties, and in Baja California, Mexico (Skinner and Pavlik 1994). In San Diego County, the species is found along the coast from Carlsbad to the U.S.-Mexican border, and in inland locations from the San Marcos Mountains south to Otay Mountain. Within the North County SAP area, the species is peripheral, occurring in Rancho Santa Fe and on slopes north of San Marcos and east of Vista.

Threats and Limiting Factors. Threats to this species include development and associated edge effects (including fuel modification, fuel suppression, and invasion of nonnative plants), as well as gravel mining.

Special Considerations. Summer holly is a fire-adapted shrub that stump-sprouts from the base of the stem or root-crown after fire or cutting (Wells 1986; Conrad 1987). Because of its capacity for resprouting, individuals are typically long-lived and populations typically experience relatively slow rates of turnover of individuals (Wells 1986). It is presumably insect-pollinated and seeds are animal-dispersed. The level of survey effort for this species in the study area is considered relatively high.

BLOCHMAN'S DUDLEYA

Dudleya blochmaniae ssp. *blochmaniae*

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

Life History. This late spring-blooming (May-June) herbaceous perennial occurs in dry stony places below 450 m (1500 ft) elevation. It is associated with coastal sage scrub.

Distribution, Abundance, and Trends. Blochman's Dudleya is found near the coast from San Luis Obispo County south to northern Baja California. In San Diego County, this species is rare on coastal bluffs. It is reported from Stuart Mesa on Camp Pendleton, Las Flores, La Costa, La Jolla, and Pacific Beach (Beauchamp 1986).

Threats and Limiting Factors. Loss and degradation of coastal bluffs and mesas from agriculture and development.

Special Considerations. None identified.

SHORT-LEAVED DUDLEYA

Dudleya blochmaniae ssp. *brevifolia*

USFWS: Proposed Endangered

CDFG: Endangered

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

Life History. *Dudleya brevifolia* is a perennial, rosette-forming, diminutive leaf-succulent. It is generally found on dry, sandstone bluffs in chamise chaparral. Populations are confined to the red sandstone-capped areas of the Linda Vista Terrace, a distinctive, uncommon habitat marked by thin soils, reddish ironstone concretions, and sparse vegetation. This tiny plant resembles the small, hard mineral concretions found in its habitat.

Distribution, Abundance, and Trends. The vestigial range of this species is approximately 2.5 miles wide by 7 miles long between La Jolla and Del Mar. Historical occurrences include Torrey Pines, the rim of La Jolla Canyon, the mesa on the south side of McGonigle Canyon, the mesa east of Del Mar, Crest Canyon, and Carmel Mountain. The species has been extirpated from the mesa above La Jolla and Del Mar Heights Road. Some other populations may also be extirpated. *Dudleya brevifolia* is protected in Torrey Pines State Reserve.

Threats and Limiting Factors. Loss and degradation of coastal bluffs and mesas from agriculture and development.

Special Considerations. None identified.

STICKY DUDLEYA

Dudleya viscida

USFWS: Proposed Endangered

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

Life History. Sticky Dudleya is found on dry, rocky slopes or cliffs below 1200 feet elevation and is typically associated with coastal sage scrub or chaparral.

Distribution, Abundance, and Trends. This species occurs in only about 5 localities in Orange, Riverside, and San Diego counties (Skinner and Pavlik 1994) and is limited to coastal areas. Despite its restricted distribution, the species appears to be locally abundant, reproducing, and stable (Moran 1979). Within the Narrows section of the San Luis Rey River, for example, population size has been estimated at approximately 10,000 individuals (WESTEC 1983). In San Diego County, the species occurs southward from San Juan Capistrano (type locality), including Camp Pendleton (San Mateo Creek, Stuart Mesa, bluffs at the mouth of the Santa Margarita River), Oceanside, Carlsbad, Escondido Creek, San Dieguito River Valley, and Santa Fe Valley. Within the North County SAP area, Sticky Dudleya is scattered and peripheral, perhaps occurring only in the upper San Mateo Creek watershed and in Eastern Rancho Santa Fe (Reiser 1994).

Threats and Limiting Factors. The primary threats to this species are road construction (e.g., road widening), development, and associated edge effects.

Special Considerations. Sticky Dudleya is an herbaceous perennial plant. It is insect-pollinated (e.g., bees, bee flies, Wyatt 1983), and seeds are presumably self-dispersed. This species may be susceptible to fires. The level of survey effort for this species in the study area is considered relatively high. Moran (1979) feels that the species responds well to transplanting, and revegetating slopes that have been modified during construction might be a viable and cost-efficient option for conservation of this species in areas where it is to be eliminated.

SAN DIEGO BUTTON-CELERY

Eryngium aristulatum var. *parishii*

USFWS: Endangered

CDFG: Endangered

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

Life History. San Diego button-celery is a prostrate biennial or perennial species that blooms from March through July.

Distribution, Abundance, and Trends. San Diego button-celery is found on clay soils in and near vernal pools and grasslands on the lower coastal slope of Riverside and San Diego counties, and in Baja California, Mexico (Skinner and Pavlik 1994). In San Diego County, the species is found on Camp Pendleton, Carlsbad, San Marcos, Marine Corps Air Station Miramar, Clairemont Mesa, College Park, East San Diego, and Otay Mesa (Beauchamp 1986; USFWS 1993; Ogden 1998). This species' only location within the North County SAP area may be north of San Marcos (Reiser 1994).

Threats and Limiting Factors. Threats to San Diego button-celery include agriculture, urbanization, road maintenance, vehicular traffic, foot traffic, and edge effects.

Special Considerations. San Diego button-celery is a prostrate biennial or perennial herbaceous plant. It reproduces by outcrossing and is presumably insect-pollinated. Seeds are self- and, possibly, animal-dispersed (Zedler 1987). The level of survey effort for this species in the study area is considered relatively high.

CLIFF SPURGE

Euphorbia misera

CNPS rating: List 2, 2-2-1

Life History. This irregularly branched shrub occurs on sea bluffs or in coastal sage scrub on the southern, lower coastal slope.

Distribution, Abundance, and Trends. Cliff spurge's coastal range extends from Corona Del Mar to Baja California. Cliff spurge is also known from San Clemente and Santa Catalina islands and Whitewater in the Colorado Desert, where it is associated with creosote bush scrub. In San Diego County, this species is known from Carlsbad, Point Loma, San Diego, Sweetwater Valley, and Otay Mesa. It also occurs across the border in the Tijuana Hills (Beauchamp 1986).

Threats and Limiting Factors. Cliff spurge is threatened primarily by development (Smith and Berg 1988).

Special Considerations. None identified.

COAST BARREL CACTUS

Ferocactus viridescens

USFWS: FSC

CNPS rating: List 2, 1-3-1

Life History. It is primarily associated with coastal sage scrub, although it has also been documented in chaparral and grassland habitats.

Distribution, Abundance, and Trends. San Diego barrel cactus is restricted to San Diego County and Baja California, Mexico (Skinner and Pavlik 1994). In San Diego County, this species occurs on dry slopes and mesas below 1500 m (4922 ft) along the coastal slope from Oceanside south to the U.S.-Mexican border. Although the species was formerly widespread within its San Diego range, it now persists in numerous, fragmented populations. Approximately eight major populations of this species were identified in the MSCP study area. Because the species' distribution is concentrated in the southwestern part of the county, its distribution within the North County SAP area is probably marginal at best (Reiser 1994).

Threats and Limiting Factors. The primary threats to this species are urbanization, off-road vehicular traffic, horticultural collecting, and edge effects.

Special Considerations. San Diego barrel cactus is a perennial plant (stem succulent) that presumably is not particularly well adapted to fire because of its succulence. It is insect-pollinated. It has a fleshy fruit, and seeds are presumably self-dispersed. It apparently spreads slowly and requires relatively open ground with sparse herbaceous cover within open shrublands. The level of survey effort for this species in the study area is considered relatively high.

SOUTHERN TARPLANT

Hemizonia (Centromadia) parryi australis

CNPS rating: 1B

Life History. The southern tarplant grows rarely in seasonally wet grasslands, often with a saline component to the soil.

Distribution, Abundance, and Trends. This species occurs in coastal southern California southward from Santa Barbara County through northern Baja California, Mexico (Hickman et al. 1993, Reiser 1994). In San Diego County it is known from very few locations, including the Ramona grasslands, which is its only location within the North County SAP area.

Threats and Limiting Factors. Development and agriculture threaten this rare species in its vulnerable grassland habitat, which is not often conserved in regional planning schemes (Reiser 1994).

Special Considerations. Tolerance or preference for slightly saline soil may be a factor in the restricted distribution of this species.

HEART-LEAVED PITCHER SAGE

Lepechinia cardiophylla

USFWS: FSC

CNPS rating: 1B

Life History. This is a spring and summer blooming shrub that occurs in chaparral and lower elevation woodlands.

Distribution, Abundance, and Trends. Heart-leaved pitcher sage occurs on lower slopes of the Santa Ana Mountains and in Baja California (Reiser 1994). Its only occurrence in San Diego County is in the Iron mountain system between Poway and Ramona (Reiser 1994), so it may be of marginal occurrence within the North County SAP area.

Threats and Limiting Factors. The only San Diego County location is on public land, so development is risk is presumably low.

Special Considerations. Fire response is not documented.

SAN DIEGO GOLDEN STAR

Muilla clevelandii

USFWS: FSC

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

Life History. San Diego goldenstar is a spring-blooming (March-May), herbaceous perennial that occurs infrequently in clay soils on dry grassland mesas and hillsides (Reiser 1994).

Distribution, Abundance, and Trends. This herb is found only in southwestern San Diego County and northwestern Baja California, Mexico (Skinner and Pavlik 1994; Wiggins 1980). A survey of herbarium specimens of this plant collected in the past century and deposited at the San Diego Natural History Museum indicates that few locations still exist in an undeveloped state or condition otherwise suitable for supporting populations of this plant. In San Diego County, the species occurs in Carlsbad, Escondido Creek, Rancho Santa Fe, the vicinity of Lake Hodges, Del Mar Mesa, Carmel Mountain, Poway, Fernbrook, Marine Corps Air Station Miramar, Mira Mesa, Tierrasanta, Santee, Dehesa Mountain, Proctor Valley, Otay Mesa, and Marron Valley (Ogden 1995). San Diego goldenstar occurs marginally at best in the North County SAP area, perhaps occurring only around Rancho Santa Fe and San Marcos (Reiser 1994).

Threats and Limiting Factors. Threats to this species include urbanization, road construction, vehicular traffic, and illegal dumping.

Special Considerations. San Diego goldenstar is an herbaceous perennial that is presumably insect-pollinated (e.g., bees, Wyatt 1983). In addition, it likely reproduces asexually by producing corm offsets, and transplantation/reintroduction of corms and corm offsets may be an effective method of enhancing populations. Seeds are presumably self-dispersed. The level of survey effort for this species in the study area is considered relatively high; however, flowering of bulb species depends on climatic conditions, so this species could be missed during a poor survey year.

LITTLE MOUSETAIL

Myosurus minimus var. *apus*

USFWS: FSC

CNPS rating: List 3, 2-3-2

Life History. Little mousetail is a small, tufted, spring-blooming (February-April) annual.

Distribution, Abundance, and Trends. Little mousetail has a relatively widespread distribution, occurring in Butte, Colusa, Solano, Contra Costa, Alameda, Stanislaus, Kern, Riverside, San Bernardino, and San Diego counties, as well as in Oregon and Baja California, Mexico (Skinner and Pavlik 1994). In San Diego County, the species is restricted to Camp Pendleton (Stuart Mesa, Wire Mountain), Carlsbad, Ramona, the

mesas north of San Diego, National City, Proctor Valley, and Otay Mesa. The only likely occurrence of this species in the North County SAP area is in Ramona (Beauchamp 1986, Reiser 1994). Little mousetail is found in vernal pools and alkaline marshes.

Threats and Limiting Factors. Threats to this species include vehicular traffic, livestock grazing, agriculture, and edge effects (Smith and Berg 1988).

Special Considerations. Little mousetail is a small annual that may experience yearly fluctuations in population size. It is presumably insect-pollinated (Grant and Grant 1965), and seeds are self- and, possibly, animal-dispersed. The level of survey effort for this species in the study area is considered relatively high.

SPREADING (=DITCH) NAVARRETIA

Navarretia fossalis

USFWS: PE

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

Life History. Prostrate navarretia is a diminutive, white-flowered annual that occurs in vernal pools and roadside depressions below 450 m (1476 ft) elevation and can be locally common.

Distribution, Abundance, and Trends. This herb occurs in western Riverside and southwestern San Diego counties and in northwestern Baja California, Mexico (Skinner and Pavlik 1994; USFWS 1998a). The species appears to be surviving somewhat better in Baja California, where Moran (1977) reported that it is well established in a few vernal pools and, to an even greater degree, in several widely scattered artificial depressions. In San Diego County, this species is found in Carlsbad, San Marcos, Ramona, National City, and Otay Mesa. The only likely locations in the North County SAP area are in Ramona and north of San Marcos (Reiser 1994).

Fewer than 30 populations of prostrate navarretia occur in the U.S., and nearly 60% of these populations occur on Otay Mesa in San Diego County or near Hemet and along the San Jacinto River in Riverside County (USFWS 1998a). The largest populations occur in Riverside County and have been estimated to support 300,000 and 75,000 individuals, respectively. Most populations, however, support fewer than 1,000 individuals and occupy relatively small areas (e.g., <1 acre) (USFWS 1998a). The USFWS (1998a) estimates that this species occupies less than 300 acres of habitat in the United States.

Threats and Limiting Factors. Threats to prostrate navarretia include urbanization and associated edge effects (including alterations in the watershed that may reduce the source of water and encourage invasion of habitat by upland plant species), agriculture, and road construction.

Special Considerations. Prostrate navarretia is a low, spreading or ascending annual herb that may experience yearly fluctuations in population size. It is presumably self-breeding

(autogamous) (Grant and Grant 1965; Spencer and Rieseberg 1998), and seeds are presumably self-dispersed. The level of survey effort for this species in the study area is considered relatively high.

CHAPARRAL BEARGRASS

Nolina cismontana

USFWS: FSC

Life History. Not provided.

Distribution, Abundance, and Trends. This shrub-like member of the Lily family is restricted to the western Transverse Ranges and lower Peninsular Ranges, terminating in extreme northern San Diego County (Hickman et al. 1993, Reiser 1994). Its entire San Diego distribution is confined to the watershed of the middle San Luis Rey River in the vicinity of Pala, which is within the North County SAP area.

Threats and Limiting Factors. Chaparral beargrass is threatened by expanding orchard and residential development (Reiser 1994).

Special Considerations. Occurs in open shrublands (coastal sage scrub, chaparral) on south-facing slopes (Reiser 1994). Edaphic restrictions questionable.

COAST SCRUB OAK

Quercus dumosa

USFWS: FSC

CNPS rating: 1B

Life History. Not provided.

Distribution, Abundance, and Trends. This stout shrub is a component of chaparral on north-facing slopes and sheltered canyons near the coast from the south coast ranges into northern Baja California (Hickman 1993, Reiser 1994). In San Diego County it has a scattered (fragmented) distribution generally within ten miles of the coast (Reiser 1994). Due to the coastal restriction of this oak, its only potential occurrence within the North County SAP area is in Rancho Santa Fe.

Threats and Limiting Factors. This species is continually threatened by expanding urbanization and associated edge effects in coastal regions.

Special Considerations. None identified.

ENGELMANN OAK

Quercus engelmannii

CNPS rating: 4

Life History. This arborescent oak is drought-deciduous.

Distribution, Abundance, and Trends. This oak of the south coastal ranges and northern Baja California is regionally restricted, but fairly widespread in north San Diego County. Stands occur within the North County SAP area from Guejito Ranch, Ramona, and Mesa Grande to Valley Center and Pala (Reiser 1994).

Threats and Limiting Factors. Stands of trees are resistant and protected by many local ordinances, but reproduction may be impaired by herbivory by native species and cattle (Reiser 1994).

Special Considerations. There is evidence that this species may be more vulnerable to fire than other tree oaks.

SAN MIGUEL SAVORY

Satureja (=Calamintha) chandleri

USFWS: FSC

CNPS rating: 4

Life History. Not provided.

Distribution, Abundance, and Trends. This very rare sub-shrub has a disjunct distribution on low mountaintops from the Santa Ana Mountains to northern Baja California, Mexico, where it most often occurs as a component of chaparral (McMinn 1939, Reiser 1994). In San Diego County most of the locations are south and west of the San Vicente Creek area, with a scattered concentration in the Sweetwater – Otay area (Reiser 1994). There are at least two locations within the North County SAP area near the Riverside County line (Reiser 1994).

Threats and Limiting Factors. Currently protected by its remote locations, largely, by chance, on protected mountains, (Reiser 1994).

Special Considerations. Possibly restricted to gabbroic or metavolcanic soils (Reiser 1994).

GANDER'S BUTTERWEED

Senecio ganderi

USFWS: FSC

CDFG: Rare

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

Life History. Gander's butterweed is a yellow-flowered, spring-blooming (March-May), herbaceous perennial.

Distribution, Abundance, and Trends. This species has a highly restricted distribution, occurring only in the southwestern part of San Diego County. It is an understory component of chamise chaparral (Reiser 1994). Known locations include El Cajon Mountain, McGinty Mountain, Lawson Peak, and Tecate Mountain (Beauchamp 1986; Wier 1986). This species occurs locally in chaparral between 400 and 1200 m (1312 and 3937 ft) elevation. A disjunct population in extreme northern San Diego County and within the North County SAP area is apparently part of a population in Riverside County (Reiser 1994).

Threats and Limiting Factors. Currently protected by its distribution on remote peaks, many of which are protected (Reiser 1994).

Special Considerations. This species possibly requires gabbroic soils (Reiser 1994).

PARRY'S TETRACOCCLUS

Tetracoccus dioicus

USFWS: FSC

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

Life History. Parry's tetracoccus is generally common where it is found. Most of its populations are not extensive, even though the number of localities where it occurs is relatively large. It occurs in chaparral and coastal sage scrub and is typically associated with gabbro soils.

Distribution, Abundance, and Trends. Parry's tetracoccus occurs in Orange, Riverside, and San Diego counties, and in Baja California, Mexico (Smith and Berg 1988, Skinner and Pavlik 1994). In San Diego County, the species occurs sporadically throughout the coastal foothills, where it appears to be restricted to gabbro soils, which form uncommon outcrops in the southern California batholith. Representative locations include Fallbrook (Red Mountain Grade), Agua Tibia Mountains, Rainbow, San Marcos Mountains, Vista, Ramona, Barona Valley, Gomez Creek, McGee Truck Trail, Monserate Mountain, McGinty Mountain, Sequan Peak, Lee Valley, Dehesa, Tecate Junction, and Jacumba (H. Wier pers. comm.; Beauchamp 1986). Although Wiggins (1980) lists *T. dioicus* as occurring on the western flanks of both the Sierras Juarez and San Pedro Martir, the San Diego Natural History Museum includes specimens from localities only about as far

south as Santo Tomas (31° 28' N). Several locations within the North County SAP area include Fallbrook, Rainbow, north of San Marcos, and Ramona.

Threats and Limiting Factors. The primary threats to this species are development and agriculture.

Special Considerations. Parry's tetracoccus is likely a fire-adapted shrub, although its fire-response mechanism is not known. This species is presumably insect-pollinated (Crepet 1983), and seeds are presumably self-dispersed. The level of survey effort for this species in the study area is considered moderate, particularly in the northeastern portion of the study area.

ANIMALS

SAN DIEGO FAIRY SHRIMP

Branchinecta sandiegoensis

USFWS: PE

Life History. The San Diego fairy shrimp is usually found early in the rainy season, after mesa pools, roadside ditches, and tire ruts fill.

Distribution, Abundance, and Trends. This species is currently known to occur only in San Diego County and in Valle de las Palmas, Baja California Norte, Mexico, but is still commonly found in San Diego County vernal pools.

Threats and Limiting Factors. The San Diego fairy shrimp has been listed as an endangered species because of its restricted distribution and the loss of its habitat in San Diego County (Simovich and Fugate 1992). Threats to this and all other vernal pool species include agriculture, urbanization, road maintenance, vehicular and foot traffic, edge effects, pollution, and isolation from other pools and wetlands.

Special Considerations. This species prefers shallow water (<30 cm). Optimal water temperatures usually range from 10-15°C. Simovich and Fugate (1992) found that they could hatch eggs in this temperature range. There is limited information on this animal's life history and physiological requirements.

RIVERSIDE FAIRY SHRIMP

Streptocephalus woottoni

USFWS: Endangered

Life History. Not provided.

Distribution, Abundance, and Trends. The Riverside fairy shrimp is restricted to a scattered distribution in vernal pools and temporary ponds between southwestern Riverside County and northern Baja California, Mexico. Primary locations for this species include the vicinity of Temecula, Riverside County (Eng et al. 1990), Otay Mesa, MCB Camp Pendleton, and Marine Corps Air Station Miramar in San Diego County (Ogden unpublished data, Simnovich and Fugate 1992). It has also been collected in Baja California Norte, Mexico (Brown, Wier, and Belk, in press).

Threats and Limiting Factors. Threats to this and all other vernal pool species include agriculture, urbanization, road maintenance, vehicular and foot traffic, edge effects, pollution, and isolation from other pools and wetlands.

Special Considerations. The Riverside fairy shrimp appears to be a warm water species, typically not appearing until late in the season (Eng et al. 1990), although it has been observed as early as late January (Ogden unpublished data). It can co-occur with other species of anostraca. It typically occupies pools in which the water persists into April or May and which reach a minimum depth of 30 cm at filling (Eng et al 1990).

QUINO CHECKERSPOT BUTTERFLY

Euphydryas editha quino

USFWS: Endangered

Life History. Distribution of this species is complicated by complex metapopulation dynamics involving local extinctions and population explosions, which lead to recolonization of unoccupied habitat. Further complications arise from the fact that the Quino checkerspot butterfly larvae can diapause for as long as seven years. Adults emerge from mid-January through April, but peak emergence is from mid-February to early-April.

Distribution, Abundance, and Trends. The historical distribution of the Quino checkerspot butterfly included Los Angeles, Riverside, Orange, and San Diego Counties, southward into Baja California. It formerly occurred from Otay Mesa in south San Diego County north to Rancho Bernardo. Fifty years ago, this species was described as one of the most common butterflies in the county (Murphy 1990). Currently, populations are known only from the area between San Miguel Mountain and Otay Mountain in southern San Diego County and several locations in Riverside County and Baja California (J. Brown personal communication). The Emmels noted that San Diego populations were particularly threatened (Emmel and Emmel 1973).

Threats and Limiting Factors. The distribution of this species has been greatly reduced because of loss of habitat from development and habitat degradation. The decline has been exacerbated by complex metapopulation dynamics and ecological pressures resulting from a prolonged drought in California during the late 1980's early 1990's (Murphy 1990, Brown 1991).

Special Considerations. There is very little dispersal of adults between centers of population abundance (Ehrlich et al. 1980). According to Ehrlich et al. (1975) the principal larval host plants of this species in San Diego are the dot-seed plantain (*Plantago erecta*) and possibly the wooly plantain (*Plantago insularis*). It is possible that other plantain species are used as well (Brown 1991). Owl's clover (*Castilleja exserta*) may be used in later stages of development of the larvae (J. Brown personal communication). Adults will take nectar from plants such as chia (*Salvia columbariae*) and tidy-lips (*Layia platyglossa*). Potential habitat for Quino checkerspot in the region includes relatively low-growing, open vegetation communities that typically include sparsely vegetated patches of soil supporting dot-seed plantain and other potential larval food and nectaring plants. These habitats include vernal pools (Allen 1990), lake margins (Emmel and Emmel 1973), nonnative grassland, perennial grassland, open areas within shrub communities, and desert fringes (Ballmer et al. 1999).

HARBISON'S DUN SKIPPER BUTTERFLY

Euphyes vestris harbisoni

USFWS: FSC

Life History. The species is restricted to riparian areas and intermittent streams, particularly oak woodlands where the larval host plant, San Diego sedge (*Carex spissa*), occurs. Often these riparian areas are associated with chamise and southern mixed chaparral.

Distribution, Abundance, and Trends. Harbison's dun skipper is a local endemic subspecies that occurs in a series of scattered and disjunct colonies throughout western San Diego County. The known range of this species extends from San Diego County to as far north as the Santa Ana Mountains of Orange County (Orsak 1977). Typically this species is not found within 10 miles of the coast. Largest known populations are in the Escondido and Ramona areas.

Threats and Limiting Factors. This species has declined because of habitat loss, encroachment by development, introduction of pollutants into riparian systems, and elimination of the host plant through competition with invasive non-native plants (Brown and McGuire 1983, Brown 1991).

Special Considerations. San Diego sedge (host plant) usually occurs in scattered groupings on channel banks of streams and ephemeral drainages. Wetland habitats in which San Diego sedge is not expected to occur include vernal pools, disturbed wetlands, and tamarisk scrub. A search of San Diego sedge localities in 1980-1981 indicated that Harbison's dun skipper was present at nearly all locations where the plant was found in considerable numbers but the insect was never found in the absence of the plant (Brown 1982).

HERMES COPPER BUTTERFLY

Lycaena hermes

USFWS: FSC

Life History. Emergence of the adults of this species occurs from about May 20 to July 20 (Emmel and Emmel 1973). Adults visit flowers, especially those of flat-top buckwheat (*Eriogonum fasciculatum*).

Distribution, Abundance, and Trends. The Hermes copper is restricted in range from about 18 miles south of Santo Tomas in Baja California, northward to about Fallbrook in San Diego County, and eastward from approximately Interstate 15 about 40 miles inland. In San Diego County Hermes copper is reported from El Cajon, Suncrest, Mission Gorge, Dulzura, Guatay, Old Viejas Grade and McGinty Mountain (Brown, pers. comm., Faulkner and Klein 2002). Many former localities have been developed or disturbed.

Threats and Limiting Factors. Fire can rapidly eliminate colonies of Hermes coppers and their host plants. It has been suggested that natural colonization may be very slow due to the sedentary nature of the adult butterfly (Brown, pers. comm.). Furthermore, post-fire stands of larval host plant may not be suitable for this species until they are about 18 years old (Faulkner and Klein 2002).

Special Considerations. The distribution of the Hermes copper is closely tied to the distribution of the larval foodplant, redberry (*Rhamnus crocea*) (Emmel and Emmel 1973), which occurs in chaparral or coastal sage scrub.

ARROYO TOAD

Bufo californicus

USFWS: Endangered

CDFG: Species of Special Concern

Life History. Adult arroyo toads spend most of the year in burrows in upland habitat near washes and streams. Non-breeding habitat includes sage scrub, mixed chaparral, oak woodland, and sagebrush habitats. Breeding activity has been observed from February to July depending on temperatures and precipitation (Sullivan 1992, Sweet 1993). Breeding occurs in quiet, clear backwaters of streams as waters recede from the floods of the wet season. Males call from suitable breeding habitat at night. The call is a musical trill heard in 10 second bursts. Eggs are laid on the bottom of the shallow pools, usually in tangled strings of 1-2 rows. The eggs are sensitive to siltation and require good water quality. Because the eggs are laid in very shallow water and are not anchored or attached rapid changes in stream flow can leave the eggs stranded and dry or wash them away. The tadpoles reach a maximum length of about 1.5 inches and are solitary and extremely cryptic, typically mottled or spotted with blackish to brown colors. Young metamorphs bask during the day on sandy or gravelly beaches in the mid to late summer before beginning the subterranean life of the adults.

Distribution, Abundance, and Trends. The Arroyo toad is typically associated with gravely or sandy washes, stream and river banks, and arroyos of semiarid parts of the southwest from near Santa Margarita in San Luis Obispo County to northwestern Baja California.

Threats and Limiting Factors. An estimated 75 percent of the historical habitat of the species has been destroyed and many of the remaining populations are threatened (Sweet 1993). The primary reasons for the decline to the species include dams and water projects, urban development, agriculture and grazing and human recreational activities in breeding areas.

Special Considerations. The activities of adult toads outside the breeding season are not well documented. The adults spend much of the year in burrows and are nocturnal and can occasionally be found at night foraging on open, sandy areas around the drainage or adjacent open habitats. Seasonal movements of up to one kilometer upland from breeding pools have been recorded at Camp Pendleton in northern San Diego County (Ogden, USMC unpublished data). Much of the population probably moves into habitat outside of the typical inundation area of the drainage.

CALIFORNIA RED-LEGGED FROG

Rana aurora draytoni

USFWS: Endangered

CDFG: Species of Special Concern

Life History. The California red-legged frog frequents marshes, slow parts of streams, lakes, reservoirs, ponds, and other usually permanent water sources. It occurs primarily in wooded areas in lowlands and foothills, although it can also be found in grassland. It is considered a pond frog (Stebbins 1966) and is typically associated with deep water pools (at least 0.5 meters in depth) fringed by thick vegetation (Zweifel 1955; Hayes pers. comm.), especially arroyo willow or native cattails. The breeding season in southern California occurs between January and July; depending on local weather patterns. During this time the males call from the water while floating, producing weak vocalizations (Hayes and Krempels 1986).

Distribution, Abundance, and Trends. The subspecies *R. a. draytoni* ranges from Mendocino County to northwestern Baja California along the coastal plains and into the coastal ranges as well as in the Sierra foothills from Tehama County to Tulare County.

This species was once common and widespread throughout southern California. At this time the California red-legged frog appears to be extinct in San Diego county; the only currently known population in southern California is in Riverside County. It is possible, however, that populations in some of the more remote or inaccessible areas of the county have been overlooked due to the frogs secretive, nocturnal habits.

Threats and Limiting Factors. The decline of the California red-legged frog, as well as other western ranids, is probably the result of numerous confounding factors such as competition with and predation by introduced species (bullfrogs and large fish), acid rain, pathogens and parasites and catastrophic events (severe drought and scouring floods) (Hayes and Jennings 1986).(Hayes, pers. comm.). Another major reason for the frog's decline in San Diego County has been habitat alteration. An estimated one-third of red-legged frog habitat has been altered or destroyed by activities such as agriculture, urbanization, channelizing of streams and construction of reservoirs (SDHS 1980.).

Special Considerations. The adults are strictly nocturnal and extremely wary; any attempt to census this species must be conducted at night. These frogs often exist in small populations (Hayes pers. comm.) and as such are sensitive and subject to local extinctions. The tadpoles of this frog require cool water (>21°C is lethal); therefore habitat alterations that increase water temperature, such as removal of riparian vegetation or reduction in stream flow could lead to local extinctions.

WESTERN SPADEFOOT TOAD

Scaphiopus hammondi

USFWS: FSC

CDFG: CSC

Life History. The western spadefoot spends little of its life active on the ground surface. During the brief spring breeding season it emerges at night following early spring rains to breed in temporary ponds, vernal pools, and backwaters of slow flowing creeks. The remainder of the year is spent torpid in burrows in upland habitats such as grassland and coastal sage scrub.

Distribution, Abundance, and Trends. This spadefoot is almost endemic to California, ranging from the Central Valley and southward on the coastal slope from Point Conception to northern Baja California (CDFG 1988, Jennings and Hayes 1994). The overall range appears to not have decreased, although it has become fragmented by human expansion. Eighty percent of the original occupied habitat of this species is reported to have been lost in southern California (Jennings and Hayes 1994).

Threats and Limiting Factors. Larvae are highly vulnerable to non-native aquatic predators, such as fish (e.g. mosquitofish), bullfrogs, and crayfish. Presence of these predators can preclude successful reproduction in a particular breeding pool (Jennings and Hayes 1994). The most profound threat to this species, however, continues to be loss and degradation of both breeding and burrowing habitat, which eliminates some populations and isolates others (Jennings and Hayes 1994).

Special Considerations. Tadpoles grow at an accelerated rate and transform in as little as three weeks in ephemeral pools; longer in deeper pools. Eggs are not laid until the water temperature rises above 9° C, but remains less than 30°, and lasts for at least three weeks (Brown 1966 and 1967, Jennings and Hayes 1994). The western spadefoot is best

surveyed for at night, optimally after a warm rain. The tadpoles are readily identifiable at later developmental stages. Soil conditions at aestivation sites are not well understood (Jennings and Hayes 1994).

COAST RANGE NEWT

Taricha torosa torosa

CDFG: CSC

Life History. This sub-species is found along the entire California coast, but genetic evidence suggests that animals southward from Monterey may be distinct races or species (Jennings and Hayes 1994). The Coast Range newt is more adapted to terrestrial life than other California salamanders and indeed spends most of its life away from the water: most of the year is spent in an upland burrow up to a kilometer away from breeding pools (Hedgecock 1978). Reproduction occurs between late winter and spring. Males arrive at breeding pools and remain through most of the season, awaiting the females, which come to water only briefly to mate and lay eggs. Breeding occurs in ponds and quiet pools of streams. Upland habitat ranges from woodland, brush, to grassland (Stebbins 1985).

Distribution, Abundance, and Trends. The southern California range of the Coast Range newt is in west-flowing drainages southward from Monterey to San Diego County. This range has likely always been fragmented within historic times (Jennings and Hayes 1994).

Threats and Limiting Factors. Only populations south of Monterey County have “Species of Special Concern” status in California (Jennings and Hayes 1994). In Southern California this species has been subject to outright loss of upland and breeding habitat, further isolation of populations, and more insidious degradation of breeding streams from water control and associated higher siltation (Jennings and Hayes 1994).

Special Considerations. Persistent surface water in pools and quiet streams is required for at least three to five months for the adults to gather and for the larvae to metamorphose (Jennings and Hayes 1994). Little is known about the conditions required at and distances traveled to burrowing sites.

SOUTHWESTERN POND TURTLE

Clemmys marmorata pallida

USFWS: FSC

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

SDHS: Threatened

Life History. The southwestern pond turtle inhabits slow-moving rivers, streams and ponds, where it seeks permanent water. In intermittent streams, the turtles rely on small pools that persist through the dry season. Nests are excavated beyond the watercourse in banks or in open uplands up to 400 meters from the water (Storer 1930). Nesting and

oviposition typically occurs from May through July. Incubation times in Washington have been recorded at 90-104 days (Holland 1991). Most young are believed to overwinter in the nest and emerge the following March or April (Holland 1985). The female southwestern pond turtle reaches sexual maturity at 9-11 years of age. Records based on recaptured turtles indicate known lifespan of at least 40 years (Holland 1991).

Distribution, Abundance, and Trends. Low to moderate elevations on the coastal slope and mountain ranges from San Francisco Bay and the southern central valley southward to northern Baja California (Stebbins 1985, Jennings and Hayes 1994).

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

Special Considerations. Emergent marsh vegetation along the watercourse is needed for cover. A dense riparian canopy does not allow sufficient sunlight through for basking. Water levels must be deep enough to provide cover and foraging habitat for a population. Turtles have been observed to move as much as 1.5 kilometers along a drainage in one season (Rathbun 1992) but movement can be restricted by long stretches of dry streambed in intermittent creeks. Other important habitat requirements are protruding rocks, vegetation mats or partly submerged logs for sunning.

ORANGE-THROATED WHIPTAIL

Cnemidophorus hyperythrus beldingi

USFWS: FSC

CDFG: Species of Special Concern

SDHS: Threatened

Life History. The orange-throated whiptail appears to prefer sage scrub that covers about 50 percent or less of the ground and which lacks dense grasses among the shrubs, but will also occupy areas of higher shrub density, open floodplains, sparse grasslands, open chaparral, riparian scrub, and oak woodlands (V. Horchar pers. comm.). Distribution in shrub habitats is uneven such that whiptail densities can be relatively high where adequate food and habitat structure exist. Densities of orange-throated whiptails appear to be lower in north coastal San Diego County (e.g., Camp Pendleton) than are observed in south San Diego County (Dave King pers. comm.). Home range size for males is approximately 0.07 acre and for females is approximately 0.15 acre (Bostic 1965), but

has been documented at up to 1 acre (Milstead 1957). This species is not territorial.

Distribution, Abundance, and Trends. This subspecies is restricted to the extreme southwest of California and northwest of Baja California Norte, Mexico (Stebbins 1966). In California, it is found on the west side of the Peninsular Ranges between sea level and 3,000 feet, in Los Angeles, San Bernadino, Orange, Riverside and San Diego counties (Zeiner et al 1988). It is still locally common in many areas where it remains. Documented orange-throated whiptail locations within the North County SAP area include northeast of Escondido, north Oceanside, south San Marcos. This species has declined significantly during the last 50 years as a result of habitat loss.

Threats and Limiting Factors. The principal threat to the orange-throated whiptail is degradation and loss of habitat. This species can also be impacted by off-road vehicle activity, over-grazing by livestock, and predation by introduced predators (e.g., cats and dogs) (San Diego Herpetological Society 1980b). A limiting factor to the species' range is the availability of its primary food item, the termite *Reticulitermes hesperus*.

Special Considerations. One particular species of termite (*Reticulitermes hesperus*) constitutes a significant portion of the whiptail's diet. It is possible that invasive nonnative ant species (i.e., Argentine ant (*Linepithema humile*) and fire ant (*Solenopsis invicta*) could significantly reduce or eliminate the termite prey base in smaller, edge-affected habitat patches (T. Case pers. comm.; Suarez et al. 1998).

SAN DIEGO HORNED LIZARD

Phrynosoma coronatum blainvillei

USFWS: FSC

CDFG: Species of Special Concern

SDHS: Endangered

Life History. The San Diego horned lizard occurs from sea-level to elevations of over 7000 feet and frequents a variety of habitats from sage scrub and chaparral to coniferous and broadleaf woodlands (Stebbins 1966). It is most often found on sandy or friable soils with open scrub. Habitat requirements include open areas for sunning, bushes for cover, and fine loose soil for rapid burial. Harvester ants are the primary food item of the horned lizard and indicate potential for occurrence of the lizard in an area. This taxon is primarily active in late spring (April-May) and early summer (June-July) after which individuals typically aestivate. The distribution of horned lizards is locally patchy and dependent upon a variety of factors, including microhabitat characteristics (e.g., areas with loose sand; R. Fisher pers. comm.) and the availability of its primary food item, harvester ants.

Clutch size ranges from 6 to 16 eggs (Stebbins 1954) with a mean of 13 eggs (Pianka and Parker 1975). Egg-laying occurs from late May through June (Pianka and Parker 1975). Little is known about the home range of *P. coronatum*; however, a close relative in Arizona (*P. solare*) typically establishes a well-defined home range (Baharav 1975). The

mean maximum distance between capture points for males was 98 feet and for females was 49 feet, or a 0.7-acre home range for males and a 0.2-acre home range for females (assuming a circular home range). Ecologists (e.g., T. Case, UCSD; R. Fisher, SDSU) are currently studying abundances and movement of this species throughout San Diego County and are expected to discover new information relevant to species management in the near future.

Distribution, Abundance, and Trends. This subspecies occurs in extreme southwestern California to northwestern Baja California, Mexico, ranging southward in the Transverse and Peninsular Ranges at elevations below 8,000 feet from southwest Santa Barbara County (Stebbins 1966, Jennings and Hayes 1994). In San Diego County it is relatively widespread and occasionally locally common from the coast to the western edge of the desert (SDHS 1980). This species has declined significantly during the last 50 years as a result of habitat loss and other threats.

Threats and Limiting Factors. Threats to this species include urban development, conversion of habitat to agriculture, collecting of individuals for the pet trade (SDHS 1980), off-road vehicle activity, overgrazing by livestock, collection for pets, ecological effects of introduced ant species, and predation by introduced predators (e.g., cats and dogs). This species also appears to suffer from fragmentation of habitat and degradation of native vegetation that leads to invasion by dense exotic herbaceous plants.

Special Considerations. The San Diego horned lizard forages almost exclusively on harvester ants (e.g., *Pogonomyrmex* and *Pheidole* spp.). It consequently disappears where introduced Argentinean ants (*Linepithema humile*) competitively exclude harvester ants (San Diego Herpetological Society 1980b; T. Case pers. comm.; Suarez et al. 1998). Argentine ant invasion is a significant edge effect in San Diego horned lizard habitat. Argentine ants penetrate up to 200 meters into native habitat from the urban edge or irrigated landscaping (Suarez et al. 1998). Therefore, smaller fragments (e.g., <30 acres) of habitat would lack core area refugia that are not invaded by Argentine ants (Suarez et al. 1998) and may not be able to sustain native harvester ants that support horned lizards. Horned lizards are known to increase depredation on beetles where Argentine ants have displaced harvester ants (R. Fisher pers. comm.); however, the ecological consequences of this predatory switch are not known.

Infrequently used dirt roads may provide suitable habitat conditions for horned lizards. Because of the short annual activity period mentioned above, absence of horned lizards or horned lizard sign outside of the species' window of activity does not preclude the presence of a population. It is recommended that any surveys of appropriate habitat be conducted within the period of activity.

COOPER'S HAWK

Accipiter cooperii

USFWS: FSC

CDFG: CSC

Life History. The Cooper's hawk nests primarily in oak woodlands and large, mature riparian trees such as willows and cottonwoods, but also will utilize Eucalyptus. This species breeds from late March through June. Nesting occurs from sea level to the mountains, but birds of the lowlands are resident. Winter populations are augmented by birds from colder, northern climates. This is one of several “bird hawks”, whose primary prey is smaller species of birds. For this reason the Cooper’s hawk can be found in a variety of habitats where songbirds congregate, especially in the winter. This can often include residential areas.

Distribution, Abundance, and Trends. The Cooper’s hawk remains widespread as a breeding and wintering species in southern California. It has adapted to human landscape changes somewhat by utilizing non-native trees and foraging in developed areas. However, it is not certain as to how its distribution has changed as native riparian and other woodland habitats have been replaced by exotic vegetation. Although adaptable, this hawk remains sensitive to disturbance around the nest and increasing urbanization is likely to contribute increasingly to this disturbance.

Threats and Limiting Factors. The Cooper’s hawk has declined as a breeding species in California because of destruction of riparian woodland and possibly due to trophic magnification of environmental toxins from pesticides and other sources.

Special Considerations. None identified.

TRICOLORED BLACKBIRD

Agelaius tricolor

USFWS: FSC

CDFG: CSC

Life History. This marsh-dwelling species is very unusual among California landbirds in that it is both highly colonial and highly nomadic. Apparently this is an adaptation for successful reproduction in a variable environment. The species exhibits low predictability in its nesting locations from year to year: known suitable sites will go unused for years, yet the species will appear and breed suddenly in areas with no previous records. Local food abundance may be a factor in nest site selection, as local resources must often support hundreds of nesting pairs. Nesting density is always high, often consisting of hundreds or thousands of nests within a few acres of marsh, and is highly synchronous among pairs (Beedy et al. 1991). Wetlands with tall emergent vegetation (marsh, young willows, tamarisk) are essential for breeding, but must be surrounded by ample open country such as grassland, farmland, lakeshores, or scrub for foraging.

Distribution, Abundance, and Trends. The tricolored blackbird is found almost exclusively in the Central Valley and coastal lowlands of California, occurring only sparingly in extreme southern Oregon and into northern Baja California, Mexico (Beedy et al. 1991). It experienced a notable decline around the turn of the 19th Century as large areas of California were converted to agriculture, but within 30 years it had to some extent adapted to this agricultural conversion (DeHaven 1975). The extent of the species' range has not changed in the last century, but the overall population has dropped to about half of what it once was due to continuing habitat conversion and declining insect (food) populations resulting from pest control measures (DeHaven 1975). Since the 1980's, the declining trend has accelerated due to loss of breeding habitat (Beedy et al. 1991).

Threats and Limiting Factors. Loss of habitat from removal of wetlands, insect control, and development. Pesticide poisoning may be a threat considering the often strong reliance on agricultural food sources, although there is no evidence of reproductive failures.

Special Considerations. Absence of the species, even for several consecutive years, may be no indication of habitat suitability for this species. Tricolored blackbirds can readily utilize recently created marshlands caused by water impoundments, which may have implications for the potential for habitat restoration in dry areas (Lovio pers. comm.).

SOUTHERN CALIFORNIA RUFOUS-CROWNED SPARROW

Aimophila ruficeps canescens

USFWS: FSC

CDFG: CSC

Life History. The rufous-crowned sparrow is a sedentary species found on low-elevation (sea level to 600 meters) dry slopes throughout most of the southern 2/3 of California, excluding the Central Valley (Grinnell and Miller 1944). It is most often associated with open scrub, oak savannah, or grassland with low vegetation profile and often in association with rock outcroppings. It forages and nests on the ground, usually near low vegetation. Unlike several other species that breed in these dry habitats, the rufous-crowned sparrow remains year-round and probably maintains the same territories as in the breeding season.

Distribution, Abundance, and Trends. California subspecies are geographically separated from others farther east in the southwestern states. This sub-species is found in the lower Transverse and Peninsular Ranges into northwestern Baja California, Mexico (Grinnell and Miller 1944).

Threats and Limiting Factors. In southern California this bird's range coincides strongly with the distribution of coastal sage scrub, which has certainly resulted in a loss of historical habitat. The species' sedentary habits may limit its dispersal capabilities in highly fragmented environments (see below).

Special Considerations. The rufous-crowned sparrow's responses to complex anthropogenic changes to the southern California landscape indicate which factors are important to the species. Loss and fragmentation of coastal sage scrub on the lower coastal slope have certainly fragmented this species' distribution in a general sense. However, its distribution was probably always fragmented by the scattered dispersion of its preferred microhabitat: sparsely or openly vegetated slopes. Many areas of mature scrub and chaparral are naturally too dense for this bird (Lovio pers. obs.). Conversely, in moderately fragmented areas, habitat for this species has been enhanced by disturbance to vegetation from grazing, fire, or other factors. Disturbance cannot be chronic or continuous if this bird is to persist, though. Rapid colonization of moderately disturbed sites suggests that the rufous-crowned sparrow has adequate dispersal abilities, despite its sedentary habits (Lovio pers. obs.). It is tolerant of small habitat patch sizes, providing its preferred microhabitat is present (Lovio 1996). At low population densities this species often becomes very quiet and secretive (Lovio pers. obs.).

GRASSHOPPER SPARROW

Ammodramus savannarum perpallidus

USFWS: MNBMC

Life History. This species occurs in the coastal lowlands in undisturbed grassland, but can tolerate sparse shrub cover of up to approximately 10% (Lovio pers. obs.). It prefers tall, dense grasses, but native grass species are not essential. The grasshopper sparrow, named for its trilling song, is migratory, arriving in late winter to early spring (February to March) and remaining into the fall. Nests are built on the ground, beneath grasses.

Distribution, Abundance, and Trends. The grasshopper sparrow has a discontinuous distribution throughout the grasslands of the lower coastal slope and Central Valley of California. In southern California its historical distribution is a matter of conjecture, although this bird has likely benefited from agricultural conversion of lands in the 19th and early 20th Centuries. Later in the 20th Century, however, large areas of grassland were lost to suburban development, which has fragmented the range of the grasshopper sparrow. This species is under increasing threat as remaining grasslands compete with ever-expanding development and generally lack the degree of protection afforded to certain other vegetation types.

Threats and Limiting Factors. Habitat loss from development. Disturbance from heavy grazing and agriculture. Habitat fragmentation. Pesticides.

Special Considerations. Population centers in San Diego County occur in the few large remaining grassland areas, which are highly separated from one another. The grasshopper sparrow can occupy fairly small patches of habitat, but local populations are limited by this species' fairly low breeding density (fewer than 10 pairs per 100 acres of grassland) (Lovio pers. obs.). The importance of small, occupied habitat patches in the landscape is uncertain within the greater metapopulation that is presumed to exist.

Metapopulation dynamics, however, are somewhat moderated by the migratory nature of this species, which probably ensures a higher proportion of occupied patches.

BELL'S SAGE SPARROW

Amphispiza belli belli

USFWS: FSC

CDFG: CSC

Life History. This bird is a shrub specialist that inhabits large, continuous tracts of relatively low, open shrublands. It can, however, tolerate patchy shrub distribution in a mosaic with grassland as long as it is not subject to high degrees of disturbance. The sage sparrow is non-migratory, but forms small, wandering flocks in the non-breeding season (Lovio pers. obs.). It nests near the bases of low shrubs.

Distribution, Abundance, and Trends. Bell's sage sparrow is restricted to the coastal lowlands of California and the edges of the Central Valley (Grinnell 1944). It is a scattered and localized resident on the lower coastal slope San Diego County (Unitt 1984), where it is relegated to the last large remnants of coastal sage scrub and chaparral. In the interior its distribution is discontinuous, despite vast areas of chaparral (see below).

Threats and Limiting Factors. Habitat loss and fragmentation are the greatest threat to this sparrow. It does not occur on patches of habitat smaller than about 300 acres (Lovio 1996). The sage sparrow also appears to be sensitive to disturbance from human activity.

Special Considerations. The sage sparrow prefers relatively low, open shrublands, such as may be found in coastal sage scrub or in chaparral that is recovering from disturbance. This habitat preference may explain its patchy dispersion in the interior of the county: its long-term distribution may depend on the distribution chaparral that is 5 to 10 years post-fire (Lovio 1996).

GOLDEN EAGLE

Aquila chrysaetos

USFWS: Bald Eagle Act

CDFG: CSC

Life History. Golden eagles forage in grassy and open, shrubby habitats and nest primarily on cliffs, with secondary use of large trees (e.g., oaks and sycamore). Breeding pairs may occupy territories of several square miles, within which they may often use several nest sites, shifting nests sites from year to year.

Distribution, Abundance, and Trends. Golden eagles are distributed throughout North America, Eurasia, and north Africa (Johnsgard 1990). Golden eagle occur as breeding residents in the western half of the United States and formerly nested in the northeast (Terres 1980, Johnsgard 1990). This species is an uncommon resident throughout

California and San Diego County (Zeiner et al. 1990, Unitt 1984). In western San Diego County the number of breeding golden eagles (38 pairs) decreased by 33 percent between 1928 and the late 1970's (Scott 1985). This decrease has continued since the early 1980s (J. Oakley personal communication). Active nesting pairs in the southwest half of San Diego County occur near Ramona, Lake Hodges, tributary canyons of the San Pasqual Valley, San Vicente Reservoir, El Capitan Reservoir, San Miguel Mountains, San Ysidro Mountains, and Marron Valley (Ogden 1995).

Threats and Limiting Factors. This species has declined because of loss of foraging and nesting habitat to urban and agricultural development, human persecution (illegal shooting), incidental poisoning of prey species (e.g., ground squirrels and prairie dogs), egg collecting, power line electrocution, and human disturbance at the nest (Snow 1973, Johnsgard 1990, Scott 1985).

Special Considerations. None identified.

BURROWING OWL

Athene cunicularia hypugaea

USFWS: FSC

CDFG: CSC

Life History. Burrowing owl inhabit open areas such as grasslands, pastures, coastal dunes, desert scrub, and the edges of agriculture fields (Unitt 1984; Ogden unpublished data). Burrowing owls use rodent burrows throughout the year for shelter from weather and predators. Burrowing owls also place their nests in burrows. In Southern California the most commonly used rodent burrow is that of the California ground squirrel (*Spermophilus beecheyi*) (Collins 1979). The burrowing owl nesting distribution is strongly correlated to local burrow distribution. Nesting densities vary from eight pairs per square kilometer in optimal habitat to one pair per 58 square kilometers in poor quality habitat (Johnsgard 1988). They form short term pair bonds with male territoriality peaking during pair formation and declining after egg laying. Not all individuals capable of breeding do so every year.

Distribution, Abundance, and Trends. The breeding range of the North American subspecies of burrowing owl extends south from southern Canada into the western half of the United States and down into Baja California and central Mexico (Johnsgard 1988). Burrowing owls have declined through much of their range because of habitat loss due to urbanization, agricultural conversion, and destruction of ground squirrel colonies (Remsen 1978).

Threats and Limiting Factors. The incidental poisoning of burrowing owls and the destruction of their burrows during eradication programs aimed at rodent colonies has also been a large factor in their decrease (Collins 1979; Remsen 1978; Zarn 1974). Although burrowing owls are relatively tolerant of lower levels of human activity, there are human related impacts such as shooting and the introduction of non-native predators

which are also causes of their decline (Zarn 1974). This species often nests and perches near roads where they are vulnerable to roadside shooting, being hit by cars, road maintenance operations, and general harassment (Remsen 1978).

Special Considerations. None identified.

COASTAL CACTUS WREN

Campylorhynchus brunneicapillus cousei

CDFG: Species of Special Concern

Life History. This is an isolated, coastal subspecies of a bird that is widely distributed in the low deserts of the southwest. The coastal cactus wren is sedentary and restricted to coastal sage scrub vegetation supporting moderate to large stands of the shrub-forming cholla and prickly pear cacti. Such cacti are not found in the foothills and mountains that separate the coastal population from the birds in the desert. Cactus wrens build numerous conspicuous, grassy nests in areas they occupy, but only use a select few of these for breeding.

Distribution, Abundance, and Trends. The coastal southern California population of cactus wren is seriously endangered throughout its range, which is restricted to coastal lowlands from the San Juan Creek drainage basin in Orange County south to the Tijuana [?] River drainage basin in extreme northwestern Baja California (Rea and Weaver 1990). Once widespread in San Diego County, by 1990 it had been reduced to fewer than 400 pairs in about 55 sub-populations. Some of the larger colonies occur near Lake Jennings and around the San Diego Wild Animal Park (Ogden.1992).

Threats and Limiting Factors. Most local populations are threatened by proposed developments, and most are questionably viable, as they consist of only one to four pairs. The long-term viability of this bird on the coast is questionable because of habitat fragmentation and degradation.

Special Considerations. There is contradictory evidence regarding the dispersal abilities of this species, which are of great importance to its long-term persistence. Some areas of the county support a highly dispersed and disjunct population structure with local occurrence often represented by single pairs. This dispersion has elements of a metapopulation, where persistence depends strongly on dispersal. Other areas, particularly toward the outer coast, support seemingly suitable stands of habitat, but no birds (Lovio pers. obs.). Re-establishment of outer coastal sub-populations (within 10 miles of the coast) may be important to the conservation of this bird.

NORTHERN HARRIER

Circus cyaneus

CDFG: CSC

Life History. Harriers breed in marshes and grasslands and forage in grasslands, agricultural fields, wetlands, and open coastal sage scrub. Home ranges and breeding territories are variable in size and probably reflect differing habitat resources (Johnsgard 1990). This species responds to local prey abundance and can therefore be spatially unpredictable. Reproduction is similarly flexible, with no long term pair bonds and little site fidelity between years. Males are facultatively polygamous under conditions of abundant food.

Distribution, Abundance, and Trends. The northern harrier is distributed throughout North America and Eurasia (Johnsgard 1990). Northern harrier breed from northern Alaska and Canada, south into roughly the northern two-thirds of the western United States, and the northern one-third of the eastern United States. Wintering harriers utilize the southern portion of the breeding range and extend farther south into Central America. San Diego County lies at the southwest edge of the harrier's breeding range in North America (Johnsgard 1990). Northern harrier is an uncommon to fairly common winter visitor and rare and local summer resident in the coastal lowlands of San Diego County (Unitt 1984). It is disappearing as a breeding resident from the county (Unitt 1984, Bloom pers. comm.). Since the mid-1970s, some documented nesting locations in San Diego County include Camp Pendleton and Sweetwater River estuary (Bloom pers. comm.), Otay Ranch (Ogden 1992), and Proctor Valley (Unitt 1984). Nesting has also been suspected at Otay Mesa (Ogden 1992), Tijuana River Estuary, Sorrento Valley, northeast Lake Hodges, and south of San Marcos (Unitt 1984).

Harriers have declined in California in recent decades but can be locally abundant where suitable habitat remains free of disturbance, especially from intensive agriculture (Zeiner et al. 1990). The breeding population, especially in coastal southern California, is reduced because of destruction of native wetland, meadow, and grassland habitats, and burning and plowing of nesting areas during early stages of the breeding cycle (Remsen 1978).

Threats and Limiting Factors. Loss of suitable tracts of undisturbed nesting habitat from agriculture and residential development has most affected this species in coastal California.

Special Considerations. Given the typically low breeding densities of raptors, large tracts of suitable habitat may support only one pair of birds, imposing a landscape-scale structure to populations in the human environment.

WESTERN YELLOW-BILLED CUCKOO

Coccyzus americanus occidentalis

USFWS: MNBMC

CDFG: State Endangered

Life History. Western yellow-billed cuckoo is an uncommon to rare and highly localized summer resident of extensive, mature Central Valley and desert riparian habitats in scattered locations in California and western Arizona (Zeiner et al. 1990). It is perhaps the latest migratory breeding bird to arrive in California, typically not appearing on breeding grounds until June. Cuckoos are restricted to dense, tall cottonwood and willow riparian woodlands. They feed primarily by gleaning for insects in foliage, and occasionally prey on frogs and lizards, or feed on fruit (Bent 1940, Preble 1957).

Distribution, Abundance, and Trends. This species was formerly much more common and widespread throughout lowland California but has decreased drastically in abundance due to riparian habitat loss. The largest populations of breeding cuckoos in California occur along the Colorado River and along the south fork of the Kern River. This subspecies was formerly a rare summer resident in San Diego County and is now thought to be extirpated except as an occasional migrant (Unitt 1984). Since 1950, the western yellow-billed cuckoo has only been reported 3 times from San Diego County (Unitt 1984 and Ogden unpublished data). In 1993, a single, migrant yellow-billed cuckoo was observed in willow riparian woodland east of Lake Hodges (Ogden unpublished data). In the late 1970's several cuckoos were observed together less than a mile from the San Luis Rey River (Unitt 1984). According to Unitt, the number of birds suggested a possible family group and indicated that in the late 1970's there may have been a few breeding pairs in remnant woodlands of northern San Diego County.

Threats and Limiting Factors. The historical loss of extensive, old-growth riparian gallery forest in California has been the major factor in this species' marked decline. The area and kind of habitat required by this species is typically found in bottomlands of major drainages (Grinnell and Miller 1944), which have suffered the most historical loss.

Special Considerations. Although migratory, this species appears to exhibit extreme site fidelity to its breeding grounds. Occasional sightings of birds in migration in coastal southern California are tantalizing, but suggest that colonization of recovered habitats on protected drainages may still be years away.

SOUTHWESTERN WILLOW FLYCATCHER

Empidonax traillii extimus

USFWS: Endangered

CDFG: Endangered

Life History. The willow flycatcher is restricted to dense riparian woodlands of willow, cottonwood, and other deciduous shrubs and trees. In general, the riparian habitat occupied by this species tends to be localized, isolated, linear, and separated by vast

expanses of arid lands. Spring migration of the endangered subspecies is relatively late, beginning in early May and extending through June (Unitt 1984). Another subspecies which breeds to the north in the northern Sierra Nevada Mountains and the Cascade Range (*E. t. brewsteri*) migrates through San Diego between mid May and mid June. There is a period of overlapping occurrence in San Diego County riparian habitats for these two very similar looking subspecies during spring and fall migration. Fall migration of both subspecies occurs rather early, from August through mid October. Egg laying by the endangered southwestern willow flycatcher occurs in San Diego County from the end of May through the end of June. Dense willow thickets are required for nesting, and nests are often near standing water (Zeiner et al. 1990). Willow flycatchers hunt for insects from low exposed perches, flying out to catch the insects in mid-air.

Distribution, Abundance, and Trends. This endangered subspecies is a summer-breeding resident in riparian habitats in southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and northwestern Mexico (USFWS 1995). The population of southwestern willow flycatcher in southern California was estimated to be less than 80 pairs in the early 1980's (Unitt 1984). In San Diego County only two substantial breeding populations are known to remain along the Santa Margarita River and the upper San Luis Rey River, although reproduction has been documented in recent years on the San Dieguito River as well (Lovio unpub. obs., Kus and Beck 19__).

Threats and Limiting Factors. The southwestern willow flycatcher was listed as endangered by the USFWS in February 1995 because of "extensive loss of riparian breeding habitat, brood parasitism by the brown-headed cowbird (*Molothrus ater*), and lack of adequate protective regulations" (USFWS 1995a). This subspecies was previously listed as endangered by the CDFG in December 1990.

Special Considerations. Although associated with the same habitat as the endangered least Bell's vireo, the southwestern willow flycatcher has not responded similarly to the natural and enhanced, yet only partial, recovery of riparian systems. Whereas the vireo has experienced a phenomenal increase in numbers and distribution, the flycatcher has remained localized and scarce. The continued absence of the flycatcher in several former parts of its range in San Diego County that have recovered large areas of riparian habitat suggests a profound difference in dispersal ecology between the two species.

AMERICAN PEREGRINE FALCON

Falco peregrinus anatum

USFWS: MNBMC

CDFG: Endangered

Life History. Peregrines are typically found near large bodies of water where they feed primarily on other birds, especially waterbirds. During winter peregrine falcons have been observed at the Tijuana River Valley, San Diego Bay, San Diego River Valley,

Mission Bay Park, Batiquitos Lagoon, Lake Hodges, San Pasqual Valley, San Vicente Reservoir, Mount Israel area, and Sweetwater Reservoir (Ogden 1995).

Distribution, Abundance, and Trends. The Peregrine falcon is distributed throughout North America, South America, Africa, and Australia. This species was eliminated as a breeding resident from much of continental United States during the 1950s but is naturally recovering much of its former breeding range in North America or is being reintroduced into its historic range (Johnsgard 1990). In San Diego County, this falcon is a rare winter visitor and breeding resident, most commonly observed from October through May (Unitt 1984). Three breeding pairs have bred around San Diego Bay since about 1989 (Pavelka 1991, Unitt pers. comm., Ogden 1994, Ogden unpublished data). Peregrine falcon populations have declined due to pesticide contamination which caused declines in reproductive success because of egg shell thinning (Johnsgard 1990). all coastal wetlands and lagoons are considered critical foraging locations within the study area.

Threats and Limiting Factors. Bioaccumulation of pesticides resulted in egg-shell thinning and significant population declines in this species during the middle of this century. Reduction or banning of the harmful pesticides has significantly reduced this threat, and the peregrine falcon is continuing to recover from the effects of pesticide contamination (Johnsgard 1990; Finch 1992; Wootton and Bell 1992). Disturbance of nest sites by humans continues to be a threat to this species, and collisions with utility wires may also be a problem. This species continues to be threatened by pesticide poisoning on wintering grounds, low breeding densities and reproductive isolation, lack of gene flow between populations, and reduced availability of foraging habitats and avian prey (Finch 1992).

Special Considerations. Peregrines traditionally nest on cliff faces but have adapted to also nest on tall building ledges, towers, and similar tall structures. Peregrine falcons are susceptible to the effects of bioaccumulation of toxins due to their high trophic position. Bioaccumulation of DDE was a primary cause of major population declines. Although far-ranging and fairly tolerant of humans on their foraging grounds, these birds are sensitive nesters that require highly secluded nest sites.

BALD EAGLE

Haliaeetus leucocephalus

USFWS: Threatened

CDFG: Endangered

Life History. This large fish-eating eagle is always associated with water. It nests high in trees in northern parts of North America.

Distribution, Abundance, and Trends. The Bald eagle is breeding bird in the boreal or mountainous northern parts of the continent, but winters widely to the south. It occurs in

San Diego County as a sparse winter visitor, being most frequent at Lake Henshaw and occasional at other large, inland lakes, such as San Vicente.

Threats and Limiting Factors. The historical major decline of this species in the lower 48 United States was attributable to habitat loss, shooting, poisoning, and reproductive failure through environmental contamination. Wintering birds are still threatened by fragmented landscapes and contamination through their food supplies.

Special Considerations. None identified.

YELLOW-BREASTED CHAT

Icteria virens auricollis

CDFG: CSC

Life History. The yellow-breasted chat is a spring-summer resident restricted to riparian woodland, where it frequents dense undergrowth. It prefers larger stands of taller, denser trees to earlier seral phases of riparian vegetation.

Distribution, Abundance, and Trends. The yellow-breasted chat is uncommon throughout much of its range in the lower coastal plain and foothills of California, where it is a summer resident of riparian woodland and forest with a dense understory. This species actually reaches its highest abundance in the lowlands of southern California. The yellow-breasted chat is considered an indicator species for potential endangered least Bell's vireo habitat.

Threats and Limiting Factors. Population declines are associated with the loss of suitable habitat and brown-headed cowbird nest parasitism.

Special Considerations. Although sensitive to habitat degradation, this bird can successfully occupy fairly small patches of mature riparian forest and riparian scrub as long as the drainages remain functional and undisturbed. This has implications for the value of relatively small riparian restoration projects.

OSPREY

Pandion haliaetus

CDFG: CSC

Life History. This species is strictly a fish-eating hawk that frequents either fresh or salt water. It is primarily a wintering bird in coastal southern California and at inland reservoirs with suitable food supplies. Osprey foraging habitat includes coastal estuaries and large lakes and reservoirs that support forage fish populations. Ospreys may nest near these habitats in large dead-topped trees, snags, cliffs, or man-made structures that can support their large nests.

Distribution, Abundance, and Trends. The osprey is a widely distributed species in North America. It is a regular fall and winter visitor to San Diego County, where it is fairly widespread and conspicuous, but occurs in low density at reservoirs and other bodies of water such as Agua Hedionda Lagoon, Lake Hodges, Santee Lakes, Lake Murray, Otay Lake, San Vicente Reservoir, and San Diego Bay (Unitt 1986, T. Oberbauer pers. comm., J. Lovio pers. comm.). The osprey is rare during the breeding season in San Diego County.

Threats and Limiting Factors. Ospreys are vulnerable to human disturbance at their nest sites and adverse impacts to potential foraging habitat.

Special Considerations. None identified.

WHITE-FACED IBIS

Plegadis chihi

USFWS: FSC

CDFG: CSC

Life History. The white-faced ibis forages and nests in brackish and fresh water lagoons, rivers, lakes, wet agricultural fields and occasionally salt marshes. Nesting typically takes place in the northern summer range of the species, but has been reported from some of the larger wetland areas of San Diego County (Unitt 1986).

Distribution, Abundance, and Trends. The range of the species extends from Oregon, south to Argentina and southeast to Louisiana. The white-faced ibis is an uncommon winter migrant and visitor and a rare summer resident of San Diego County, which represents the southern extreme of the west coast distribution of this species. The white-faced ibis occurs regularly in small numbers in lower river valleys in San Diego County. It is uncommon and localized in winter and a sporadic breeder on the coastal slope. Recent breeding colonies in San Diego County include Buena Vista Lagoon and Guajome Lake. The occurrences at Buena Vista, Batiquitos, and San Elijo lagoons, and Guajome Lake are considered major populations, and the breeding colonies at Buena Vista Lagoon and Guajome Lake are critical locations.

Threats and Limiting Factors. Loss of extensive marsh habitats, seasonal drying of wetlands for mosquito and cattail control, spraying for mosquito control, and nesting failures caused by pesticides (Remsen 1978; Terres 1980).

Special Considerations. Breeding areas need to have minimal human disturbance. Water in brackish portions of salt marsh must be fresh enough to support tall emergent vegetation such as cattails and tules, which are used for nesting. This species is able to forage widely from its nesting areas, tending to move up and down major drainages in search of food. It requires at least partially undisturbed river or major creek systems for all its needs (J. Lovio pers. comm.). Foraging habitat must support relatively large invertebrate and small aquatic vertebrate prey.

COASTAL CALIFORNIA GNATCATCHER

Polioptila californica californica

USFWS: Threatened

CDFG: Species of Special Concern

Life History. The California gnatcatcher is closely associated with coastal sage scrub vegetation, particularly Diegan coastal sage scrub occurring on gentle slopes within the maritime and coastal climate zones. In San Diego and Orange counties, the California gnatcatcher occurs most commonly in coastal sage scrub vegetation with high proportions of *Artemisia californica* and *Eriogonum fasciculatum* and less commonly in sub-associations dominated by *Salvia mellifera* or *Rhus integrifolia* (Atwood 1980, 1990; Mock and Jones 1990; Bontrager 1991; Weaver 1998); however, in some portions of the gnatcatcher's range (e.g., western Riverside County) this pattern may be less pronounced (Braden In Press). Initial studies suggest that the California gnatcatcher may be moderately sensitive to the effects of habitat fragmentation and development activity (Atwood 1990, ERCE 1990, Lovio 1996, Ogden unpublished data). The territory size requirements of the gnatcatcher varies with habitat quality. Documented home ranges have varied from 6 to 45 acres in San Diego County (RECON 1987, ERCE 1990a, ERCE unpublished data). Studies of the species' habitat preferences in San Diego County indicate that California sagebrush (*Artemisia californica*) and flat-topped buckwheat (*Eriogonum fasciculatum*) are the primary plants used by gnatcatchers when foraging for insects (RECON 1987, ERCE 1990b, Ogden unpublished data).

Distribution, Abundance, and Trends. The coastal California gnatcatcher is restricted to the coastal slopes of southern California, from Los Angeles County south to El Rosario, Baja California, Mexico. The USFWS has estimated that coastal sage scrub habitat has been reduced by 70 to 90 percent of its historical extent (USFWS 1991) and little of what remains is protected in natural open space.

Regional Population Estimates and Trends. Atwood (1990, 1992b) estimated that approximately 1,811 to 2,291 pairs of coastal California gnatcatchers remained in southern California. Of these, 24 to 30 pairs were estimated in Los Angeles County, 224 to 294 pairs in Orange County, 724 to 916 pairs in Riverside County, and 837 to 1,061 pairs in San Diego County. Michael Brandman Associates (MBA 1991) estimated that 1,645 to 1,880 pairs of California gnatcatchers occurred in the United States (20 to 30 pairs in Los Angeles County, 325 to 350 pairs in Orange County, 300 to 400 pairs in Riverside County, and 1,000 to 1,100 pairs in San Diego County).

Based on later information, the USFWS (1993) estimated that about 2,562 pairs of coastal California gnatcatchers remained in the United States. Of these, 30 pairs were estimated in Los Angeles County, 757 pairs in Orange County, 261 pairs in Riverside County, and 1,514 pairs in San Diego County. Ogden (1993) estimated there were a minimum of 900 pairs of gnatcatchers in the MSCP plan area of southwestern San Diego

County. Approximately 2,800 pairs of *P. c. californica* are estimated to occur in the Mexican portion of the subspecies' range (J. Newman pers. comm. 1992).

It should be noted that the above estimates for gnatcatcher abundance in California (roughly 1,800 to 2,500 pairs, with 1,000 to 1,500 pairs in San Diego County) were made during the early 1990s, following a period of extended drought in southern California. Results of more recent (late 1990s) surveys suggest that gnatcatcher populations may have increased following relaxation of the drought. For example, the species database contained 3 or 4 gnatcatcher location points on or near the Carlsbad Municipal Golf Course property in central Carlsbad based on surveys during drought years; but surveys in 1998 documented 17 locations there (Merkel & Associates 1998).

Threats and Limiting Factors. The primary cause of this species' decline is the cumulative loss and fragmentation of coastal sage scrub vegetation by urban and agricultural development. Early studies suggested that the California gnatcatcher is highly sensitive to the effects of habitat fragmentation and development activity (Atwood 1990; ERCE 1990; Ogden unpublished data). The USFWS has estimated that coastal sage scrub habitat has been reduced by 70 to 90% of its historical extent (USFWS 1991), and little of what remains is protected in natural open space.

Predation is thought to be the primary cause of reproductive failure in land birds (Ricklefs 1969), including the California gnatcatcher (Sockman 1997; Braden et al. 1997a). Gnatcatchers are subject to predation by a wide variety of vertebrate predators (Sockman 1997; Braden et al. 1997a), including human subsidized predators (e.g., house cats, raccoons, ground squirrels, and scrub jays). Gnatcatchers are also subject to nest parasitism by brown-headed cowbirds (USFWS 1991; Ogden 1993; Braden et al. 1997a). Although nest parasitism may adversely affect gnatcatcher nest fates, this effect may be overwhelmed by other causes, especially predation and nest abandonment (Braden et al. 1997a).

Special Considerations. Not provided.

LIGHT-FOOTED CLAPPER RAIL

Rallus longirostris levipes

USFWS: Endangered

CDFG: Endangered

Life History. Light-footed clapper rails are restricted to southern California saltwater marshes dominated by cordgrass (*Spartina foliosa*) and pickleweed (*Salicornia*) which they use for nesting and escape cover. Clapper rails forage in higher marsh vegetation and along tidal creeks and at the interface between vegetation and adjacent mudflats (CDFG 1997). Rails commonly use freshwater marsh upstream from salt marsh during fall and winter. Clapper rails require a healthy tidal saltmarsh environment; abundant food in the form of crabs, clams, and related invertebrates; and tidal flats interspersed with saltmarsh vegetation as a feeding area. These conditions occur in marshes with an

adequate tidal flow to preserve normal salinity ranges and prevent stagnation (USFWS 1980). The clapper rail's nest is a loose arrangement of plant stems on high ground, well concealed in dense vegetation, usually *Spartina*. One typical nest measured 28 cm by 18 cm on the outside, with a cavity 13 cm across and 1.3 cm deep. Nests are constructed of whatever vegetation is available and are well concealed. The nests are buoyant and will float with the rising tide (Jorgensen 1975). Nesting occurs from mid-March to 1 July. Most egg laying occurs from early April to early May, with 3 to 11 eggs per clutch, usually 5 to 9. The incubation period averages 23 days (Jorgensen 1975). Both sexes are believed to incubate. The young are able to swim on the day of hatching. Breeding densities in southern California range from 0.04 to 0.8 pair per acre (Tomlinson and Todd 1973; Jorgensen 1975).

Distribution, Abundance, and Trends. The light-footed clapper rail was formerly common in all coastal marshes from Santa Barbara south to Bahia de San Quintin, Baja California. Light-footed clapper rails are uncommon and very localized residents in San Diego County (Unitt 1989). Breeding pairs of the light-footed clapper rail have been found at 22 marshes throughout its range since 1980. More recently, however, this number has declined, with clapper rails found a total of 235 pairs in only 11 marshes in 1991 (Zemba 1991). This rail is endangered because its range is restricted to the relatively small remnants of healthy marsh habitat which remain in disjunct patches along the coast. About 55% of the state population is found in Upper Newport Bay. The second largest population is found in the Tijuana National Wildlife Refuge. All of the small subpopulations face serious problems as a result of habitat degradation, human disturbance, and predation.

Threats and Limiting Factors. Threats to this species include cumulative habitat loss and degradation, genetic isolation of populations, depredation by introduced predators and artificially enhanced populations of native predators, and human disturbance of habitat (Jorgensen 1975; USFWS 1986; Zemba 1992).

Available habitat appears to be the major limiting factor for this species. Recent recolonizations of lagoons in the study area (SDNHM 1999) are therefore encouraging and suggest that if unoccupied habitat is protected and additional habitat is restored, recovery of the species in the study area is possible.

Special Considerations. Unnaturally large populations of small mammalian predators, such as skunks and foxes, and domestic cats and dogs can adversely affect rail populations via nest predation. It is therefore essential to maintain populations of larger mammalian predators, such as coyotes, in the lagoon and marsh community to prevent overpopulation of smaller predators. The Batiquitos Lagoon restoration project reopened the lagoon to full tidal influence, which is expected to enhance clapper rail habitat and populations over time. The light-footed clapper rail is already closely managed and monitored by state and federal wildlife agencies pursuant to the species recovery plan.

At least one additional large, viable population center is needed to provide this species with adequate protection from extinction (Zemba 1989).

WESTERN BLUEBIRD

Sialia mexicana

Life History. The western bluebird is a common cavity-nesting songbird of oak woodland and pine forests throughout the western United States. It is primarily a wintering species in the study area, except for limited breeding in some areas of oak woodlands.

Distribution, Abundance, and Trends. The western bluebird breeds in oak woodland-grassland ecotone areas, and winters in a wide variety of open habitats at elevations below 4,000 feet. There are no major populations or critical locations in the plan area.

Threats and Limiting Factors. Although still common, the bluebird is a habitat indicator species for two depleted habitats: oak woodland and grasslands in coastal areas of the county. The western bluebird is vulnerable to competition with more aggressive introduced species (e.g., European starling and house sparrow) for scarce nesting cavities (McLaren 1963; Zeleny 1969; Patterson 1979).

Special Considerations. Bluebirds are highly dependent on mistletoe fruit during winter. Larger blocks of habitat may be necessary to avoid edge effects, including competition for nest cavities by starlings and house sparrows, which tend to be associated with urban and agricultural areas.

LEAST BELL'S VIREO

Vireo bellii pusillus

USFWS: Endangered

CDFG: Endangered

Life History. Least Bell's vireo is restricted to riparian woodland and is most frequent in areas that combine an understory of dense young willows or mulefat with a canopy of tall willows. The least Bell's vireo arrives in San Diego County in late March and early April and leaves for its wintering ground in September. Since the vireos build their nests in dense shrubbery 3 to 4 feet above the ground (Salata 1984), they require young successional riparian habitat or older habitat with a dense understory. Therefore, riparian plant succession is an important factor maintaining vireo habitat. Nests are also often placed along internal or external edges of riparian thickets (USFWS 1986).

Distribution, Abundance, and Trends. Historically this subspecies was a common summer visitor to riparian habitat throughout much of California. Currently, least Bell's vireo is found only in willow and mulefat-dominated riparian woodlands in southern California, with the majority of breeding pairs in San Diego, Santa Barbara, and Riverside Counties. Major vireo populations are currently on six rivers in San Diego County: Tijuana, Sweetwater, San Diego, Santa Ysabel Creek, San Luis Rey

River/Pilgrim Creek, and Santa Margarita. Substantial vireo populations are currently found on five rivers in San Diego County: Tijuana, Sweetwater, San Diego, San Luis Rey, and Santa Margarita, with smaller populations on other drainages. Over 460 breeding pairs or territorial males were recorded in San Diego County in 1991 (Salata personal communication).

To reconcile conservation of the vireo and its habitat with demands for development, the San Diego Association of Governments (SANDAG) has prepared a Comprehensive Species Management Plan (CSMP) in cooperation with the state and federal wildlife agencies, the U.S. Army Corps of Engineers, Caltrans, environmental groups, property owners, and sand miners (SANDAG ____). If the plan is approved it will guide land-use decisions within drainages supporting this species.

Threats and Limiting Factors. The vireo's decline is due to loss, degradation, and fragmentation of riparian habitat combined with nest parasitism by the brown-headed cowbird (Kus 1991a; 1991b; 1992a; 1992b).

Special Considerations: Least Bell's vireos tend to prefer semi-open riparian woodlands with dense shrub understory. Reduction or elimination of cowbirds in least Bell's vireo nesting habitat appears to substantially benefit this species. Excessive noise (>62 dBA) during the nesting season may interfere with territorial behaviors and reduce reproductive success (P. Mock pers. comm.).

STEPHENS' KANGAROO RAT

Dipodomys stephensi

USFWS: Endangered

CDFG: Threatened

Life History. Suitable habitat consists of patches of disturbed grassland habitat with a high proportion of herbaceous annuals and sparse to no shrub cover, on gentle slopes with soil low in clay content (O'Farrell and Clark 1985).

Distribution, Abundance, and Trends. The species is known only from a restricted range in northern San Diego County, western Riverside County, and southwestern San Bernardino County, California (Bleich 1977; O'Farrell et al. 1986; CNDDDB 1987). As a result of human encroachment, much historically suitable habitat has been removed through urban and agricultural development. This has accentuated the disjunct nature of the species' distribution by eliminating corridors through which the kangaroo rats disperse from one tract of suitable habitat to another. Most historical locations no longer support the species, and much of the remaining habitat consists of thin strips along roadways and the bases of hills.

Threats and Limiting Factors. Fragmentation of the suitable habitat into small patches (25 acres or less) prevents emigration/immigration between patches and threatens the genetic vigor and survival of many populations.

Special Considerations. None identified.

MOUNTAIN LION

Felis concolor

USFWS: FSC

CDFG: CSC

Life History. Mountain lions typically inhabit remote hilly or mountainous areas in forest and shrub habitats. They require open water sources such as streams or rock pools, large foraging areas and rocky shelters or caves for denning. Home range of mountain lions can cover areas as large as 25 to 96 square miles for males and 3-12 square miles for females with a typical minimum home range of 15 square miles per individual (Russell 1978, Hornocker 1970). Mountain lions are chiefly nocturnal, but may also be about during the day if undisturbed. These cats are active year-round and may travel up to 25 miles per night in search of food. Prey includes mule deer (up to 60%-80% of diet), rabbit, rodents, coyotes, snakes, and occasionally livestock.

Distribution, Abundance, and Trends. The mountain lion has the largest geographical distribution of any mammal species in the western hemisphere, but it is restricted primarily to unpopulated regions in western North America (Hall and Kelson 1959). Recent California state population estimates range from 2,500 to 5,000 individuals with an increasing population trend. Fairly recent documentation of the status of the mountain lion revealed a healthy and viable population in San Diego County (Sitton 1977). In coastal San Diego County, mountain lions are known from Camp Pendleton, Palomar, Carlsbad, San Marcos, Escondido, Laguna Indian Reservation, Los Peñasquitos Canyon Reserve, Del Mar, Torrey Pines State Park, NAS Miramar, Poway, Sweetwater River, and Otay Lakes. Though the mountain lion has no sensitive status under the USFWS or CDFG ratings, it is considered sensitive by the San Diego Non-game Wildlife Subcommittee for Vertebrates.

Threats and Limiting Factors. Because of its large home range size, this species is susceptible to increased human pressures. The primary threats to the mountain lion are loss and fragmentation of large expanses of suitable habitats and human-lion interactions typically resulting in the death of the individual lion involved. Roadkill mortality is a frequent factor in more urbanized areas (Beier 1993; Ogden 1992a). Though the mountain lion has no sensitive status under the USFWS or CDFG ratings, it is considered sensitive by the San Diego Non-game Wildlife Subcommittee for Vertebrates. There is presently a moratorium on mountain lion hunting.

Special Considerations. Migration and dispersal corridors that minimize the potential for roadkill are an important component of a preserve design and will benefit mountain lions. Mountain lion populations have increased dramatically in California due to a moratorium on hunting. This has increased potential for problem encounters between lions and humans in urban/wildland interface areas.

SAN DIEGO BLACK-TAILED JACKRABBIT

Lepus californica bennettii

USFWS: FSC

CDFG: CSC

Life History. It inhabits open land but requires some shrubs for cover. Typical habitats include early stages of chaparral, open coastal sage scrub, and grasslands near the edges of brush. Grasses and forbs are the rabbit's preferred foods. Chew and Chew (1970) reported a diet of 65% shrub browse and 35% herbage. Breeding occurs throughout the year, and young are born under shrubs with no special nest structure. Home ranges averaging 45 acres have been recorded in California (Lechleitner 1958).

Distribution, Abundance, and Trends. This species is fairly common in coastal sage scrub, grassland, and open chaparral habitats from the coast to the western slope of the coastal mountains, up to 6000 in San Diego County. There are no major populations or critical locations identified in the plan area, but scattered observations occur throughout natural habitats in the area.

Threats and Limiting Factors. Black-tailed jackrabbits are suspected to be declining due to habitat loss and fragmentation.

Special Considerations. None identified.

MULE DEER

Odocoileus hemionus

Life History. Mule deer in San Diego County are non-migratory and are found in most undeveloped areas with suitable habitat. Locally, mule deer inhabit a variety of habitats, including riparian and oak woodlands, coniferous forest, coastal sage scrub and chaparral. Suitable habitat is a mosaic of vegetation, providing clearings interspersed with dense brush or tree thickets. Brushy areas and thickets are important for escape cover and thermal regulation. Deer require a permanent source of water. Mule deer are primarily active in mornings, evenings, and on moonlit nights, but may also be active at midday in winter. They browse and graze, preferring tender new growth of various shrubs such as ceanothus, mountain mahogany, and bitterbrush. Forbs and grasses are important in spring. They feed heavily on acorns where available, primarily in autumn. They also dig out subterranean mushrooms and commonly frequent salt or mineral licks. Local populations of mule deer are dispersed and seldom form herds. The usual groups consist of a doe with her fawn or a doe with twin fawns and a pair of yearlings. Bucks usually are solitary. Mule deer establish home ranges to which they restrict their movements. Information on mule deer movements in Orange County indicate that typical home ranges are fairly small, about 1.9 square miles for males, and 0.6 square miles for females. (Eastern Transportation Corridor Agency, Orange Co., Calif.). Adult does may defend

small areas in late spring and early summer when caring for newborn fawns. Usually the area includes the immediate vicinity surrounding the fawns, and changes with daily movements. Natural predators of deer include mountain lions, coyotes and bobcats.

Distribution, Abundance, and Trends. Mule deer range from the Southern Yukon and Mackenzie south through the western U. S. to Wisconsin and western Texas, and throughout Baja California and northern Mexico. In California mule deer occur throughout the state with the exception of the San Joaquin Valley and some southeastern desert areas. Most of the California population is migratory, moving to lower elevations in the fall. Mule deer presently are widespread throughout undeveloped portions of western San Diego County, although they may be declining in the county. Recently documented occupied areas include the Laguna Mountains, Camp Pendleton, Torrey Pines, Miramar, Palomar, Escondido, San Marcos, Carlsbad, Los Peñasquitos Canyon Reserve, La Jolla, Poway, Sweetwater River, and Otay Lakes (Bond 1977). Deer are fairly common in portions of the North County SAP area where sufficient habitat is present, but are apparently disappearing from coastal cities due to habitat fragmentation (e.g., Dawson-Los Monos Reserve; Kay pers. comm.). Deer require relatively large, undisturbed tracts of chaparral, coastal sage scrub, and mixed grassland/shrub habitats (Padley 1992).

Threats and Limiting Factors. The southern mule deer is not threatened with extinction within its range, but the present checkerboard of private property distribution in western San Diego County and urbanization could result in local extirpation without appropriate conservation measures. Deer populations can decline in response to fragmentation, degradation, or destruction of habitat. Overpopulation, with resultant winter mortality, occurs periodically in California. The biggest threat to local population is illegal hunting and habitat destruction or fragmentation due to urbanization. Deer populations can respond rapidly to habitat management.

Special Considerations. Corridors may be instrumental in maintaining population continuity and allowing for the dispersal of juveniles. Although mule deer are distinctly wary of humans and human development, their tolerance is probably greater than that of the mountain lion and, therefore, corridors designed to accommodate lions may serve deer as well. Deer use canyons as corridors as lions do, but in general, deer avoid canyon bottoms (Padley, 1991). This may be to avoid predation by mountain lions which spent the majority of their time in the canyon bottoms. Canyon corridors for mule deer should include the canyon slopes and ridges. Natural predators of deer have been reduced in numbers in most areas.

Highway mortality must be considered in corridor design. The use of highway underpasses by mule deer has been studied in Colorado. Deer were found to freely use bridge-type underpasses 13 feet high by 82 feet wide by 46 feet long, but were reluctant to use a cement-box type underpass measuring 10 feet by 10 feet by 100 feet (Reed 1981). Some deer would use the long narrow underpass but appeared to display great anxiety in doing so. Edelman (1990) reported significant use by mule deer of an equestrian tunnel under the 118 freeway in the Santa Monica Mountains. The tunnel was

16 feet high, 16 feet wide and over 160 feet long. During 52 weeks of monitoring, mule deer made 50 crossings. Fences designed to channel deer into underpasses must be at least 8 feet tall.

TOWNSEND'S BIG-EARED BAT

Plecotus townsendii

USFWS: FSC

CDFG: CSC

Life History. This bat is often found in cold mines or caves, not far from the entrance.

Distribution, Abundance, and Trends. In San Diego County, the bat has been reported from Barrett Lake, Greenhead Lake, Campo Lake and from near Campo (WESTEC 1977).

Threats and Limiting Factors. It is especially sensitive to disturbance by man and will quickly abandon roosts frequented by humans.

Special Considerations. None identified.